

PB-230 609

POLLUTION OF LAKE ERIE AND ITS TRIBUTARIES
(INDIANA, MICHIGAN, NEW YORK, OHIO,
PENNSYLVANIA). PROCEEDINGS OF CONFERENCE
HELD AT CLEVELAND, OHIO ON JUNE 27, 1969.
VOLUME 2

Federal Water Pollution Control Administration
Washington, D.C.

1969

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U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 230 609

PROCEEDINGS

VOLUME 2



June 27, 1969
Cleveland, Ohio

PROGRESS EVALUATION MEETING In the Matter of Pollution of Lake Erie and its Tributaries (Indiana, Michigan, New York, Ohio, Pennsylvania.)

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U. S. Department of Commerce
Springfield, VA 22151

U.S. DEPARTMENT OF THE INTERIOR • FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

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5. The fouling of power generating turbines.
6. The resulting spread of water borne disease carrying bacteria.
7. The resulting reduction of area of navigation channels.
8. The reduction of diversability of waters for recreational purposes.
9. And the resulting increased danger of flooding due to restriction of water passage channels.

Mr. Bennett stated that dredging alone, due primarily to soil erosion, costs about one half billion dollars annually. However, he emphasized that agriculture in Ohio has done more toward control of pollution, through soil conservation practices, than any other group.

In closing, Mr. Bennett recommended strongly that agricultural agencies at all levels join with other agencies at the earliest possible time to plan new imaginative ways to control pollution of all kinds which have a deleterious effect on water quality enhancement.

Having heard the comments as hereinabove reported, the sub-committee coordinator, Mr. Neal, immediately made an appointment and in the company of Mr. Robinson, visited Mr. Harrold and Dr. Edwards at Coshocton. They were furnished with all of the annual reports and available data appropo to the subject. Studies of nutrient run-off were completed in the years 1966-67-68.

It must here be pointed out that the information contained in these reports were for small, isolated watersheds in hilly country during periods of relatively low rainfall. These factors are here mentioned to point out (a) that caution must be exercised in extrapolating any data of this sort out to cover the vast portion of the North American

Continent tributary to the Great Lakes, (b) that conditions or characteristics of nutrient pick-up and run-off in flat terrain might be somewhat different than in the experimental fields and (c) the pick-up and distribution of nutrients due to run-off might be affected by the amount, intensity, duration, or frequency of rains during a given year.

Dr. Burley Schmidt of the United States Department of Agriculture, Wooster Experimental Station reports that a similar study is presently proposed for five flat terrain watersheds in Northwestern Ohio. He hopes that these projects can be started this year. The results of this proposed study project should prove to be particularly appropriate to the Lake Erie situation. In addition, Dr. Wadleigh of the U.S.D.A. Agricultural Research Service, Soil and Water Conservation Research Division in Beltsville, Maryland, through Mr. J. Lunin, Chief Soil Chemist reports the initiation of studies this year in two larger watersheds, one in Iowa, the other in Pennsylvania. He further suggests that it will probably be two years before any significant data on these watersheds will be available.

The annual reports mentioned above were reviewed by Mr. Neal who extracted the pertinent information and made a digest of the data which is included herein, identified as TABLE I. The next table (TABLE II), is a reproduction of a table previously furnished to the Ad Hoc Committee showing Phosphate Loads Discharged to Lake Erie (based on information obtained from F.W.P.C.A.)

TABLE I

The attached data is extracted from the annual reports of the U. S. D. A. Soil and Water Conservation Research Division.

The fields under investigation by this group were representative of hilly and small watersheds mainly during low flow years. Samples were collected during runoff periods.

FUTURE EXPERIMENTATION

Dr. Burley Schmidt of the U. S. D. A. Wooster Experimental Station has proposed a similar study of five, flat terrain watersheds in northwest Ohio. It is hopeful that the project may be started next year. (This would be of real interest to the P-committee.)

DATA SUMMARY

1967 Small Watersheds

P concentration reached the highest mean value of a .15 mg./l. for any of the watersheds tested in 1967. This value was reported for the watershed that had fertilizer application in 1966 and not 1967.

Large Watersheds

Highest P concentration was 1.3 mg/l, 1/4 mile below the barnyard feedlot, while the mean value of the same watershed was 0.22 mg/l.

COMMENTS MADE BY U.S.D.A.

"Both 1966 and 1967 were years of fairly low rainfall and runoff rates. There was very little erosion. Past records of rainfall and runoff indicate that runoff and erosion for 1966 and 1967 were well below average. Greater amounts and higher concentration of dieldrin and phosphorus may be expected in higher runoff in more nearly normal years."

Cont'd Table I

SMALL WATERSHED ANALYSES 1967

Watershed	Fertilizer treated	ppm		Fertilizer added in relation to P
		max.	min. mean	
No. 128, 1-2 acres	1966	0.28	0.05 0.15	8 ton/A manure, 200 lb./A N, P ₂ O ₅ , Y 180 lb./A 5-20-20
No. 111, 1.18 acres	1967	0.09	0.05 0.06	8 ton/A manure, 200 lb./A N, P ₂ O ₅ , Y
No. 113, 1.45 acres	1967	0.05	0.05 0.05	180 lb./A 5-20-20
No. 118, 1.95 acres	1967	0.12	0 05 0.05	6 ton/A manure, 50 lb./A 5-20-20
No. 192, 8 acres	1966	0.21	0.05 0.06	2.4 ton/A manure, 267 lb./A 5-20-20

LARGE WATERSHED ANALYSES 1967

No. 177 crop fields, pasture, feedlot (50 head) 76 acres	1967	1.3	0.05 0.22	Mixed fertilizers used on crop fields
No. 196 crop fields, pasture, woods, 303 acres	1967	0.05	0.05 0.05	
No. 172 Wooded area, 44 acres		0.05	0.05 0.05	

Cont'd Table I

DATA SUMMARY 1968Small watershed cropland 1968

Concentration of phosphorus in the field under investigation reached a value of 0.64 in liquid phase and 136.5 mg/l in solid phase. This occurred during one specific storm which followed heavy application of fertilizer by two weeks. It is stated in the annual report that the watershed under investigation was known to have high erosion and sediment yield. The croplands were plowed and worked in a manner to favor such runoff.

Barnyard Feedlot

A .4 acre barnyard feedlot, located in a 76 acre watershed, contributed 59% of the total phosphorus for this watershed at the one time of sampling. Concentration from the feedlot itself before dilution was 2.30 mg/l with a flow of .030 cfs. At the time of sampling transport rate of P from the upstream 0.4 acres barnlot was 60% of that at the downstream gage draining 76 acres.

Preliminary Data
Soil Watershed 1968
 Cont'd Table I

Concentration of phosphorus in runoff on May 15, 1968 (4 samples).
 The runoff is representative of croplands.

<u>Time</u>	<u>Flow cfs</u>	<u>P - liquid phase ppm</u>	<u>P - solid phase ppm</u>
1938	.265	.64	139.
1940	.138	.65	134.
1942	.090	.60	-
1946	.053	<u>.67</u>	<u>-</u>
average		.64	136.5

Phosphorus removed by the storm of May 15, 1968:

liquid phase - .09 lb.

solid phase - 1.50 lb.

total 1.59 lb.

Preliminary Data
Barnyard Feedlot 1968 (50 herd of cattle)

Concentration of phosphorus in runoff on May 11, 1968 (2 samples)

<u>cfs</u>	<u>concentration of phosphorus ppm</u>
barnyard drainage sample .030	.2.30
1/4 mile downstream of barnyard .436	0.31

TABLE II

PHOSPHATE LOADS DISCHARGED TO LAKE ERIE
(Pounds/Day Total Phosphates (P))
(Based on Data Obtained from FWPCA)

	Municipal Wastes Total	Cities of 10,000 +	Industrial Wastes	Runoff	Total
<u>WESTERN BASIN</u>					
Michigan					
Detroit R.	63,000		3,840	24,200(1)	91,040
Huron R.	1,340		98	920	2,358
Raisin R.	798		98	1,000	1,896
Ohio					
Maumee R. (2)	7,700	6,329	1,000	6,000	14,700
Portage R.	400	327	20	480	900
Total for Basin	73,238		5,056	32,600	110,894
<u>CENTRAL BASIN</u>					
Ohio					
Sandusky R.	700	558	27	2,380	3,107
Huron R.	330	142	10	422	762
Vermilion R.	50	0	10	324	384
Black R.	700	503	50	724	1,474
Rocky River	1,150	1,128	38	685	1,873
Cuyahoga R.	9,300	8,615	1,500	3,420	14,220
Chagrin R.	197	0	10	600	807
Grand R.	251	176	38	280	569
Ashtabula R.	0	0	50	27	77
Conneaut Cr.	117	0	10	71	198
Lake Erie	12,867	12,867	—	—	12,867
Shores (Ohio)					
Ohio Total	25,662	23,989	1,743	8,933	36,338

Cont'd Table II

Cont'd Table II

Municipal Wastes		Cities of 10,000 +	Industrial Wastes	Runoff	Total
Total					
Ontario					
Big Creek	10		15	22	47
Dedrich Cr.	0		0	10	10
Lynn River	20		0	32	52
Nanticoke Cr.	5		0	16	21
Sandusky Cr.	5		0	27	32
Grand River	745		2,500	3,920	7,165
Pennsylvania					
Lake Erie Shore	1,640		0	0	1,640
New York					
Cattaraugus Cr.	99		50	400	549
Buffalo R.	674	674	50	368	1,092
Minor Trib.	546		—	99	645
Totals for					
Central Basin	29,406	26,303	4,358	13,827	47,591
Totals for					
Western &					
Central Basin	102,644		9,414	46,427	158,485
Lake Huron			—	20,000	20,000
				26,427	138,485

A review of Table I leads to several basic impressions.

1. That the bare minimum of phosphates contributed from run-off of the fertilized test fields tested in 1967 was 0.05 parts per million (ppm) on a small watershed basis.
2. That the average of the small watershed test fields studied in 1967 measured in the magnitude of 0.07 with a high of 0.28 ppm.
3. For large watersheds tested in 1967 the range was from a high of 1.3 ppm to a low of 0.05 in mixed crop land, pasture, and feed lots. However it is noted that in the larger watersheds the rates of contribution from mixed crop land and pastures (without feed lots) is virtually the same as for wooded areas (that is a concentration of 0.05 ppm.).
4. A review of all the data included in Table I indicates that feed lots do contribute heavily toward phosphate contribution.
5. That years of heavier rainfall would probably increase the concentration of phosphates in the run-off.

In addition, the sub-committee has proceeded to extrapolate data from Table I and II although fully recognizing that any conclusions of impressions drawn from this preliminary data which may affect an area as large as the Great Lakes watershed may be inaccurate.

In so doing, it was necessary to make some basic ground rules:

1. The committee has limited itself, in the following examples, to the inflow to Lake Erie through the Detroit River (first line of Table II.)
2. That the total flow in the river of 91,040 pounds per day of phosphates is a measured, or known, quantity and that the contributions from municipal, industrial land run-off is calculated.
3. Not having available any information base for separation of municipal and industrial these two have been lumped together.
4. Taking the figure of 91,040 pounds per day (ppd) as known and calculating the following:
 - a. the run-off, by use of the factors described in 5a, 5b, and 5c below.
 - b. determine the municipal and industrial contribution in ppd by use of the factor described in 5a, 5b, and 5c.

- c. determine load from municipal and industrial contribution calculating 80% removal of phosphates.
- d. total resulting percentage of reduction of phosphates from the Detroit River into Lake Erie.

5. The contribution rates in the following example are as follows:

- a. 0.05 ppm, assuming all land area tributary to be forest land, as if man had never set foot on this continent.
- b. 0.07 ppm, for minimum mixed land area (no animals nor human waste except that included in municipal and industrial) in an extremely dry year.
- c. 0.105 ppm, increasing item b by about 50% to provide for a year of normal rainfall.

COMMITTEE COMMENT:

It is felt that from the preliminary data, these factors are extremely conservative, but it would be an unfair and dangerous assumption to use higher values considering the amount and extent of available data.

Rate (ppm)	Total ppd	Calc Land ppd	Mun & Ind ppd	80% reduction of Mun & Ind ppd	Resulting % reduction of total
a) 0.05	91,040	49,140	41,900	33,520	36.8%
b) 0.07	91,040	68,796	22,244	17,795	19.5%
c) 0.105	91,040	103,194	—	—	—

In the next example, the sub-committee has used the same contribution rates as described in Items 5a, 5b, and 5c, and assumed that perhaps the data on municipal and industrial discharge was more accurately known. It then calculated the land run-off contribution, added these two figures together to arrive at a total, assumed an 80% removal from all municipal and industrial waste discharge then calculated the resulting percent of removal from the adjusted total entering the Lake from this single source.

Rate (ppm)	Mun & Ind ppd	Calculated Land Run-off ppd	Total ppd	80% reduction of Mun. & Ind. ppd	Resulting % reduction of total
a) 0.05	66,840.	49,140	115,980	53,472	46.1%
b) 0.07	66,840	68,796	135,636	53,472	39.4%
c) 0.105	66,840	103,194	170,034	53,472	31.4%

The two tables above would seem to indicate that 80% removal of phosphates from the Municipal and Industrial discharges tributary to this one source of in-put into the lake would not significantly improve the water quality in the lake.

However, preliminary data would also seem to indicate that there would be a 0.05 ppm phosphate contribution from all land tributary to the lake even if it were still in its natural state. Inasmuch as this alone is probably more than enough to create and support the algal bloom in Lake Erie it would seem that the present state of eutrophication in Lake Erie is totally natural and that the aging process of our environment is out of our hands. The sub-committee cannot accept this hypothesis—we who are responsible for the heritage and environment we pass on to future generations must make a concerted effort to do what can be done.

III. CONCLUSIONS:

- a. Existing data on phosphate contribution from land run-off must be updated and reinforced by extensive research.
- b. Although not an assignment of the sub-committee, and although no data as such was gathered, or in fact sought, in the process of taking a glossary look at agricultural pollution the subject of herbicide, and pesticide pollution in land run-off was recognized—the toxic effect of this form of pollution is alarming.

- c. A total all-out effort must be made by all segments of our economy to reduce the nutrients and other pollutants from entering any of our waters.
- d. The effort required will be expensive, probably far beyond our most pessimistic estimates.

IV. RECOMMENDATION:

The sub-committee recognizes that the Ohio Department of Health, Division of Engineering, being knowledgeable of the many unanswered questions regarding phosphorus concentrations in Lake Erie, has agreed as a Lake Erie Conference Conferee that steps should be taken towards removal of at least 80% of the phosphorous flowing to Lake Erie. In addition, all cities within the Ohio portion of the Lake Erie Basin are now required to provide phosphorous removal facilities in the development of new plants or expansions of presently operating plants. In the near future phosphorus removal facilities will be required at all existing city plants within the Lake Erie Basin.

The sub-committee recommends that Directors of other affected Departments of State and federal governments be made aware of the pollution by phosphates, other nutrients, herbicides and pesticides. That they further be aware of the need for extensive and comprehensive studies to (a) accurately identify and determine concentrations of all waste sources in relation to phosphorous, (b) monitor tributary streams and Lake Erie to explain chemical and biological phenomena of algae blooms in the western basin, (c) devise ways, means, and programs for control of municipal, industrial, agricultural, and other sources.



CITY OF CLEVELAND

DEPARTMENT OF PUBLIC SERVICE
RALPH C. TYLER,
DIRECTOR

CARL B. STOKES, MAYOR

JOHN R. WOIFS,
COMMISSIONER - CITY ENGINEER

June 27, 1969

PERRY F. NUHN,
ASSISTANT COMMISSIONER

RE: Federal Lake Erie Pollution Enforcement Conference

This is to advise that the City of Cleveland has complied to Permit No. 468.15 as follows:

HEIGHTS SANITARY TRUNK SEWER

This work is under contract for engineering services with the Consulting Firm of Havens & Emerson, to be performed in connection with preliminary planning for the Heights Sanitary Trunk Sewer, authorized by Purchase Order #202-9548.

The consultant has advised us, as of March 28, 1969, that -

Preliminary work in connection with the Heights Sanitary Trunk Sewer will be completed as soon as the draft, as submitted, incorporates the review of the City of Cleveland as to scope and extent of contents. The report has selected four routes. Each has been evaluated with the costs. Some additional soil borings are still in progress. The connection of the Heights Sanitary Trunk Sewer at the Easterly Wastewater Treatment Plant has been evaluated. The contract for construction is recommended to be in three sections. Except for the printing of the final document, the work has been virtually completed.

BROADWAY SANITARY TRUNK SEWER

This work is being done by the firm of Glaus, Pyle, Schomer, Burns, and DeHaven, for engineering services performed in connection with preliminary planning for the Broadway Sanitary Trunk Sewer, authorized by Purchase Order #202-9547.

The work on this sewer has provided the City with a study of alternates with a recommended line and grade. We have evaluated this information and authorized soil borings to be made along the preferred route. It is estimated that 95% of the work has been completed to date.

FEDERAL LAKE ERIE POLLUTION ENFORCEMENT CONFERENCE

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June 7, 1969

BROADWAY SANITARY TRUNK SEWER (Continued)

A preliminary draft has been submitted to the City (February 25, 1969) and the City has reviewed and returned it to the Consultant along with our comments that are to be incorporated into the final preliminary planning document.

SOUTHWEST SUBURBAN SANITARY TRUNK SEWER

This work is under contract with the Firm of Alden E. Stilson & Associates for engineering services performed in connection with preliminary planning for the Southwest Suburban Sanitary Trunk Sewer, authorized by Purchase Order #202-9546.

The Consultant, as of April 14, 1969, has transmitted copies of the data developed from studies of the subject project. This compilation is unedited at this time, as to the City's comments and review of the material. The final report and transmittal of the copies will proceed immediately upon the City's approval.

PROJECTS COMPLETED OR UNDER CONSTRUCTION:

- | | |
|---|--------------------|
| 1. Big Creek Interceptor Repair | 1968 - 1969 |
| 2. Doan Valley Interceptor & Sewer Separation Project | Completed 1968 |
| 3. Gladstone Area Project - Separation of Sewers: | Under construction |
| a) East 51 Street | |
| b) Holyoke Avenue | |
| c) Gladstone Avenue - East 55 St. to East 40 Street | |
| d) East 47 Place | |
| 4. Erieview Area Project | Completed 1968 |
| a) East 13 Street and Walnut Avenue - separation of sewers. | |
| 5. Walnut Avenue sanitary extension across East 9 Street. Bids received January 1969. Now in progress | |
| 6. Lake Court (Off East 55 Street) | Completed in 1968 |
| 7. Cedar Avenue between Fairhill Road and East Boulevard | Completed in 1968 |
| 8. Ansel Road - relocation | Completed in 1968 |
| 9. Dike Park Drive - Woodland Avenue to East 64 Street | Completed in 1968 |

FEDERAL LAKE ERIE POLLUTION ENFORCEMENT CONFERENCE

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June 27, 1969

PROJECTS PROGRAMMED FOR 1969

1. East 12 Street Intercepting Sewer (Lakeside Avenue to Walnut Avenue)
2. Ackley Road (Linton Avenue to Morgana Avenue)
3. West 130 Street (Brooklawn Avenue to West Avenue)
4. East 43 Street (Central Avenue to Cedar Avenue)
5. East 49 Street - correction of overflow at Southerly Interceptor.
6. Lee Road at Westview Avenue - repair of defect.
7. Outhwaite Avenue (East 55 Street to East 51 Street)
8. Belvidere Avenue (East 65 Street to East 68 Street)
9. Rodman Court - East 134 Street to Coit Road

June 27, 1969

SUMMARY:

1. The City of Cleveland has continued to annually invest several million dollars of local monies for new sewers and betterments.
2. Pursuant to State of Ohio rules and regulations, separation of combined sewers is being carried out in all new developments and to the extent possible in Urban Renewal projects. One sewer alone is \$1.2 million.
3. We are proceeding with the detail plans for \$30,000,000 of trunk sewers serving the Greater Cleveland Area which is to be funded from the \$100 million Bond Fund, pending a rate increase and all without any Federal funding to date.

Applications have been repeatedly rejected. The program cannot be finalized until matching State and Federal funds are available.

4. Local governments do not have the benefit of "quick take" for right of way and the stated policy of the American Association of State Highway Officials virtually precludes the use of limited access right of way for needed sewer routes.

The Bureau of Public Roads is more liberal in this regard on limited access roads. If meaningful pollution measures are to be expedited, implementation of right of way problems must be resolved.

5. The Property Tax rate, plus equivalent local income tax in Cleveland, is now at \$68.46/\$1000 based on 40% of valuation. All pollution implementation is outside, and in addition to the property tax.

Local rates must be doubled to support the \$100 million bond issue.

CITY OF CLEVELAND
WATER POLLUTION CONTROL SCHEDULES

Wastewater Treatment Engineering Contract No.	Improvements Projects Construction Contract Identification No.	Plant	Description	Date Authorized	Design Information Engineer's Progress	Contractor's Progress	Project Construction Completion
2797	136	Easterly	Primary settling Tanks Enlargement	6-20-66	Completed	10% complete	7/1/71
21622	137	Easterly	Secondary Treatment Plant Additions	8-19-68	Plans Completed Prelim. submission		4/1/72
21622	138	Easterly	Pre-Treatment Expansion & Misc. Impts.	6-26-69	Prelim. Design by 7/70		7/1/72
2797	135	Southerly	Secondary Treatment Plant Addition	1-26-65	Completed	78% complete	4/1/72
21622	139	Southerly	Pre-Treatment Expansion	Not authorized	5% completed		
21622	140	Southerly	Post-Chlorination Digester mixing Gas handling & misc. Impts.	Not authorized	2% completed		
		Westerly	Advanced Waste Treatment		Prelim. Design by 7/70		9/73

COMPLETED CONSTRUCTION SCHEDULES ARE CONTINGENT UPON RECEIPT OF PARTIAL FUNDING FROM STATE AND FEDERAL SOURCES.

W. A. Lyon

MR. STEIN: Thank you.

Are there any further questions for Ohio?

If not, we will go on to Pennsylvania. Mr.
Lyon.

STATEMENT OF WALTER A. LYON, DIRECTOR,
DIVISION OF SANITARY ENGINEERING,
PENNSYLVANIA DEPARTMENT OF HEALTH

MR. LYON: Mr. Chairman, I have copies of my report, and I think there will be some extra copies available. I will read the first page and just skip over the balance.

In accordance with the present agreement by the Conferees to remove 80 percent of the phosphates discharged from any one State, a hearing on a plan to meet the phosphorus removal requirements adopted by the Conferees was held on March 20, 1969, in Erie, Pennsylvania.

A detailed plan to achieve 80 percent overall phosphorus removal from sewage and industrial wastes was adopted by the Sanitary Water Board on June 18, 1969. The plan is attached as Appendix A. The plan also requires improved treatment at several locations as needed to abate or prevent localized pollution problems.

W. A. Lyon

The City of Erie, the Erie Sewer Authority, and the Hammermill Paper Company, on June 18, 1969, took the final step to consummate a three-party agreement for joint treatment of sewage and industrial waste. Final planning is under way for the design of secondary treatment including phosphorus removal to serve the present Erie sewerage system and Hammermill Paper Company. The new treatment facilities will also have capacity to serve the growing areas adjacent to Erie. I think it is interesting to note that the paper mill wastes from the company have a phosphorus demand, so they will -- actually by being merged in the Erie sewage plant -- help to remove the phosphates from the sewage at Erie.

The following tentative schedule has been submitted, but not yet been approved:

Plans are to be submitted by February 28, 1970.

Construction is to be completed by December 31, 1971.

Operation is to begin by December 31, 1971.

Raw sewage is being periodically bypassed by the city of Erie at the treatment plant and at several interceptor weirs and is being continuously discharged at several bay-front sewers. In addition to the corrections described above, which will help correct this problem, a

W. A. Lyon

bay-front interceptor sewer is under design to provide relief, pick up unsewered bay-front properties and provide an interceptor for some surrounding municipalities.

Plans are to be submitted by February 28, 1970, and construction is to be started by May 27, 1970.

The Borough of Girard began construction of its sewage treatment plant improvements in August 1968 and will provide secondary treatment by August 1969. If you recall, that was the only treatment plant that was not providing secondary treatment in Pennsylvania.

The Hammermill Paper Company, as a part of the joint treatment project, expects to complete pulping process conversion by December 1970. This will very significantly affect the quality of its wastes. It will reduce the raw waste load by about two-thirds for B.O.D. and by about five-sixths for color. After connection to the city of Erie, Hammermill will have reduced its discharged B.O.D. waste load by well over 90 percent of the present raw load.

Other cases are minor and changes in status are given in our report of June 16, 1969, to the Cleveland Program Office, Federal Water Pollution Control Administration.

You will also recall that we agreed to do a

W. A. Lyon

phosphorus load survey, and in Appendix B of my report are given the pounds of phosphate per day from every discharge in Pennsylvania.

Please note that Appendix B was not paged correctly. We skipped Page B-2. There is not a missing page, we just went from B-1 to B-3, but that report lists all of the phosphate discharges. We sampled each one of them in Pennsylvania.

Just briefly, to go over the abatement plan, which is for phosphate removal, adopted by the Board, all applicants for new permits to discharge sewage and industrial wastes except for cooling water in the Lake Erie Basin must provide secondary treatment and disinfection, and phosphorus removal to the extent that the effluent will not contain more than 1.0 milligrams per liter of phosphorus.

We also will require adequate disposal of sludges containing phosphorus, and then what we have, in effect, done is to take our larger discharges and require a higher degree of phosphorus removal of them, and a lower degree of phosphorus removal or none from the smaller discharges so as to attain the overall 80 percent. Given in the report are the larger discharges, and the smaller ones which are larger discharges, two milligrams per liter. We

W. A. Lyon

also discuss some other aspects of the abatement plan and, in addition, some of the discharges to the tributaries will be required to remove more than 85 percent, and you will see that in Item A.

The timetable for implementations to issue the orders is by July 1, 1969. This is just for the phosphorus removal. And to begin phosphorus removal operation by July 1, 1971.

Now, we feel that at least one year is needed for the average sewage treatment plant to start functioning properly, so we can expect that even though the plants will go into operation by July 1, 1971, the required phosphorus removal and other effluent requirements will be met by July 1, 1972, after one full year of full-scope operation.

We also are trying to encourage, as are the other States, and as Detroit has demonstrated, the problem of regional management of wastes, and we are trying to encourage the municipalities in Pennsylvania to get together on a regional basis.

That completes my report, Mr. Chairman. I will be happy to answer any questions.

MR. STEIN: Thank you. Your whole report, without objection, will be included in the record as if read.

(The above-referred to report follows.)

"STATUS REPORT"

Water Pollution Control in the
Pennsylvania Portion of the Lake Erie Basin

June 1969

Sanitary Water Board
Pennsylvania Department of Health

STATUS REPORT TO LAKE ERIE CONFEREES

by

Commonwealth of Pennsylvania
Department of Health

June 27, 1969

(1) A hearing on a plan to meet the phosphorus removal requirements adopted by the Conferees was held on March 20, 1969, in Erie, Pennsylvania. A detailed plan to achieve 80% overall phosphorus removal from sewage and industrial wastes was adopted by the Sanitary Water Board on June 18, 1969. The plan is attached as Appendix A. The plan also requires improved treatment at several locations as needed to abate or prevent localized pollution problems.

(2) The City of Erie, the Erie Sewer Authority and the Hammermill Paper Company on June 18, 1969, took the final step to consummate a three party agreement for joint treatment of sewage and industrial waste. Final planning is underway for the design of secondary treatment including phosphorus removal to serve the present Erie sewerage system and Hammermill Paper Company. The new treatment facilities will also have capacity to serve the growing areas adjacent to Erie. The following tentative schedule has been submitted.

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Construction is to be completed by December 31, 1971
Operation is to begin by December 31, 1971

(3) Raw sewage is being periodically by-passed by the City of Erie at the treatment plant and at several interceptor weirs and is being continuously discharged at several bay-front sewers. In addition to the corrections described in (2), which will help correct this problem, a bay-front interceptor sewer is under design to provide relief, pick up unsewered bay-front properties and provide an interceptor for some surrounding municipalities.

Plans are to be submitted by February 28, 1970
Construction is to be started by May 27, 1970

(4) The Borough of Girard began construction of its sewage treatment plant improvements in August 1968 and will provide secondary treatment by August 1969.

(5) The Hammermill Paper Company, as a part of the joint treatment project, expects to complete pulping process conversion by December 1970. This will reduce the raw waste load by about two-thirds for BOD and by about five-sixths for color. After connection to the City of Erie, Hammermill will have reduced its discharged BOD waste load by well over 90% of the present raw load.

(6) Other cases are minor and changes in status are given in our report of June 16, 1969, to the Cleveland Program Office, Federal Water Pollution Control Administration.

(7) The results of a 1968 phosphorus load survey are given in Appendix B

APPENDIX A

IMPLEMENTATION PLAN FOR PHOSPHORUS REMOVAL
PENNSYLVANIA PORTION OF LAKE ERIE BASIN
(Adopted by the Pennsylvania Sanitary Water Board on June 18, 1969)

I. SCOPE

At the October 4, 1968 session of the Lake Erie Enforcement Conference (called under the provisions of the Federal Water Pollution Control Act) the conferees representing the Lake Erie Basin States of Indiana, Michigan, New York, Ohio, and Pennsylvania agreed that at least 80% removal of the phosphorus discharged by municipalities and industries should be required as a first step toward control of the accelerated eutrophication of Lake Erie. The actions included in this implementation plan are designed to carry out Pennsylvania's responsibility with respect to the conferees decision regarding phosphorus removal in the Lake Erie drainage basin.

II. GENERAL

The Sanitary Water Board, in accordance with its powers under the Clean Streams Law, will issue appropriate orders, modify permits or take other appropriate action to have all persons or municipalities under its jurisdiction abate pollution. The Board, in all cases, will require either immediate abatement or the submission of a detailed abatement schedule providing for abatement within as short a period of time as is technically possible and will cause appropriate investigations to be made to assure itself of compliance with its requirements.

III. SPECIFIC

1. All applicants for new permits to discharge sewage and industrial wastes except for cooling waters in the Lake Erie Basin must provide:

- (a) At least secondary treatment with adequate disinfection
- (b) Phosphorus removal from the wastes to the extent that the effluent will not contain more than 1.0 mg/l phosphorus as P, and
- (c) Adequate disposal of sludges containing phosphorus. (New discharges are considered to be those not listed in Appendix A of The Department of Health's Report to the Sanitary Water Board dated February 14, 1969.)

2. The permits of the following municipalities and industry will be modified to require adequate disinfection, phosphorus removal from the wastes to the extent that the effluent will not contain more than 1.0 mg/l phosphorus as P and adequate disposal of sludges containing phosphorus.

- (a) City of Erie
- (b) North East Borough
- (c) Girard Borough
- (d) Lake City Borough
- (e) Hammermill Paper Company

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3. The permits of the following cases will be modified to require adequate disinfection, phosphorus removal or control in the wastes to the extent that the effluent will not contain more than 2.0 mg/l as P and the adequate disposal of sludges containing phosphorus.

- (a) Albion Borough
- (b) General Electric
- (c) South Shore Service
- (d) Albro Packing Company
- (e) Gunnison Brothers Tannery

4. Phosphorus compounds should not be added to cooling waters by the users of these waters. All industries on the basin will be notified of the phosphorus removal requirements for Lake Erie and requested to refrain from the use of phosphorus compounds in their cooling waters

5. Dilution of raw or treated waste waters with waters that contain little or no phosphorus shall not be accepted as a substitute for treatment.

6. When municipal sewer service becomes available, the permits of existing waste dischargers listed in Appendix A of The Department of Health Report to the Sanitary Water Board, dated February 14, 1969, that are not now required to remove phosphorus will be modified to require phosphorus removal to the extent that the total phosphorus content of the effluent will not exceed 1.0 mg/l as P and shall provide for the adequate disposal of sludges containing phosphorus.

7. The permits of waste dischargers listed in Appendix A of the Department of Health Report to the Sanitary Water Board dated February 14, 1969, will be modified to require adequate disinfection in accordance with Article 300 of the Sanitary Water Board Rules and Regulations.

8. Implementation of the phosphorus removal requirements should improve the biochemical oxygen demand removals and the removal of organic suspended solids. For several existing discharges this improvement is necessary for abatement of pollution in streams tributary to Lake Erie. The permits for the following waste dischargers will be modified as follows:

(a) Gunnison Brothers Tannery - Require at least 90% overall BOD reduction. Limit the ultimate carbonaceous plus nitrogenous BOD to 150 pounds per day and the volatile suspended solids to 20 mg/l.

(b) Lake City Borough - Require at least 90% overall BOD removal. Limit the ultimate carbonaceous plus nitrogenous BOD to 50 pounds per day, and the volatile suspended solids to 20 mg/l.

(c) Girard Borough - Require at least 90% overall BOD removal. Limit the ultimate carbonaceous plus nitrogenous BOD to 50 pounds per day, and the volatile suspended solids to 20 mg/l.

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(d) North East Borough - Limit the ultimate carbonaceous plus nitrogenous BOD to 50 mg/l, and the volatile suspended solids to 20 mg/l.

(e) Welch Grape Juice Co. - Limit the ultimate carbonaceous plus nitrogenous BOD to 50 mg/l, and the volatile suspended solids to 20 mg/l.

9. Timetable For Implementation:

Issue Orders by July 1, 1969

Begin Phosphorus Removal Operation by July 1, 1971

Achieve Required Phosphorus Removal and Other Effluent Requirements by July 1, 1972

IV. COMPREHENSIVE PLANNING AND REGIONALIZATION:

Planning for sewerage and solid wastes disposal has been underway in this area. However, since the inception of this planning, major changes in treatment needs and general waste disposal practices have taken place as a result of the Lake Erie Enforcement conference, passage of the Mandatory Certification Act for sewage treatment plant operators, and the development of a coho salmon stocking program in the basin. These changes all have better water quality as their goals or needs.

The Lake Erie Enforcement Conference requires 80% removal of phosphorus from sewage and industrial waste as a first step toward reversal of the biological aging of Lake Erie. In the future higher degrees of phosphorus removal will be needed to keep pace with population and industrial growth, and it is anticipated that more stringent controls, including controls over agricultural runoff and other diffuse sources of phosphorus, will be needed to restore the lake.

The first and the major effort for phosphorus control will be directed to municipal (sewage) discharges since this is the major source of phosphorus. Phosphorus removal from sewage has not been widely practiced and is a relatively new technique. Skilled operators will be needed to achieve significant phosphorus removal at the least possible cost. The phosphorus removal standards recommended for a first step can, we believe, be achieved at existing treatment works by integration of chemical feed into existing units, provided the treatment plants are skillfully operated. Anticipated future phosphorus removal requirements will probably need tertiary or third stage treatment units.

At present it would be desirable to pool the sewage and industrial waste treatment talent in the area on a regular round-table conference basis to exchange ideas, discuss problems, and provide a helping hand when a fellow operator has operation problems.

Pooling of resources for chemical purchases and sludge disposal will probably result in savings of monies and should be explored as quickly as possible.

Comprehensive regional planning that will permit integration of many separate sewerage systems into fewer and larger systems is needed to solve both existing and

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future problems. A comprehensive sewerage feasibility study, using the Act 537 (Pennsylvania Sewerage Facilities Act) as a base, should be undertaken in those areas where additional information is needed to permit local municipalities and industries to choose among the alternatives available to achieve sewer service, waste treatment, and water quality goals.

Several of the important water quality goals that have to be considered are:

- (a) Nutrient (Phosphorus) Control.
- (b) Protection of existing and potential beaches.
- (c) Protection of trout and salmon hatchery and nursery waters.
- (d) Protection of water supplies.

For the most part these goals can be achieved through secondary treatment with phosphorus removal, and proper placement of outfalls. If discharges go to the trout and salmon streams, at least a 5:1 dilution and preferably a 20:1 dilution of stream water to secondary effluent is needed to protect the hatchery and nursery waters. Where this dilution is not available, tertiary treatment or an outfall to the lake is needed. Hopefully, comprehensive regional planning will eventually eliminate all discharges to the trout and salmon tributaries.

The Sanitary Water Board will notify all the municipal officials of the need for comprehensive planning and regionalization. The Department of Health Staff will work with these officials to develop an effective water quality management plan and program.

APPENDIX B

LAKE ERIE BASIN
PHOSPHATE SAMPLING
1968

SEWAGE					
<u>Erie County</u>	<u>No.</u>	<u>Case Name</u>	<u>Type Treatment</u>	<u>Stream Name</u>	<u>Lbs PO₄*</u>
North East Twp.	1	Pure Oil Company	Extended aeration with Pond	20 Mile Creek	3.6
	2	Larry's Economy Station	Extended aeration	Averill Run	5.0
	3	Mom's Motel	Extended aeration	Ditch to 20 Mile Creek	2.1
	4	Lakeview Motel	Extended aeration	Tributary to 16 Mile Creek	2.1
Harborcreek Twp.	5	Behrend Center P. S. U.	Extended aeration	Trout Run (A trib. to 4 Mile Creek)	2.4
	6	Harborcreek Twp. School	Extended aeration	7 Mile Creek	2.1
	7	Port Erie Plastics	Extended aeration	7 Mile Creek	15.3 (Design)
	8	South Shore Services	Contact Stabilization	Tributary to 7 Mile Creek	36.72 (Design)
	9	Klein School	Extended aeration with Pond	Tributary to Lake Erie	12.96
Greene Twp	10	Wattsburg A & SB	Extended aeration	Tributary to 4 Mile Creek	9.18

*3 pounds of phosphate (PO₄) is approximately equal to
1 pound phosphorus (P)

SEWAGE

<u>Erie County</u>	<u>No.</u>	<u>Case Name</u>	<u>Type Treatment</u>	<u>Stream Name</u>	<u>Lbs. PO₄³⁻</u>
Summit Twp.	11	Robison School	Extended aeration	Tributary to Walnut Creek	10.0
	12	Rondale Nursing Home	Extended aeration	Tributary to Walnut Creek	4.2
	13	Howard Johnson Motor Lodge	Extended aeration	Tributary to Walnut Creek	10.0
	14	Oakdale Corp. (Holiday Inn)	Extended aeration	Walnut Creek	13.0
	15	Travelers Rest	Extended aeration	Tributary to Walnut Creek	3.6
	16	Erie Vo. Tech	Extended aeration with Pond	Tributary to Elk Creek	5.25
	17	Educational T. V. N.W. Pa.	Septic Tank with Sand Filter	Tributary to Walnut Creek	0.075
	18	Humble Oil Co.	Septic Tank	Tributary to Walnut Creek	0.5
McKean Twp.	19	Georgetown Heights	Oxidation Stabilization Ponds	Ditch to Elk Creek	2.31
	20	Humble Oil	Extended aeration	Tributary to Thomas Run	0.25
	21	Popular White Thruway	Extended aeration	Tributary to Elk Creek	5.75
Springfield Twp.	22	Talzarico Truck Stop	Extended aeration	Ditch to Racoon Creek	5.0
	23	Pa. Dept. Highways	Septic Tank with Sand Filter	Tributary to Turkey Creek	3.24

*3 pounds of phosphate (PO₄) is approximately equal to 1 pound phosphorus (P)

SEWAGE					
<u>Erie County</u>	<u>No.</u>	<u>Case Name</u>	<u>Type Treatment</u>	<u>Stream Name</u>	<u>Lbs PC₄</u>
Fairview Twp.	24	Inter P. C. Corp.	Septic Tank with Sand Filter	Walnut Creek	0.69
	25	Erie Co. Home	Extended aeration	Trout Run	20.25
	26	Boyd C. Chivers	Extended aeration	Tributary to Brandy Run	3.24
	27	Kahkwa Club	Extended aeration	Tributary to Walnut Creek	1.4
	28	Humble Oil	Extended aeration	Ditch to Brandy Run	0.54
	29	Fairview Twp. I. D. C.	Extended aeration	Trout Run	2.5
	30	Lake Shore Maint Assn	Extended aeration	Tributary to Lake Erie	1.4
	31	Alpine Manor	Septic Tank with Sand Filter	Trout Run	1.2
	32	Harman Electric Company	Septic Tank with Sand Filter	Tributary to Walnut Creek	0.14
	33	Pioneer Tavern Hotel	Septic Tank with Sand Filter	Trout Run	0.75
	34	Whitehall Village	Extended aeration	Tributary to Trout Run	3.0
	35	Greenbrier Hill	Extended aeration with Sand Filter	Tributary to Walnut Creek	9.0
Millcreek Twp.	36	Presque Isle S. P.	Extended aeration with Field Tile	Lake Erie Harbor	7.0
	37	Unitarian Church	Extended aeration	Tributary to Mill Creek	0.5
	38	Ramada Inn	Extended aeration	Tributary to Mill Creek	13.24

*3 pounds of phosphate (PO₄) is approximately equal
to 1 pound phosphorus (P)

SEWAGE					
<u>Erie County</u>	<u>No.</u>	<u>Case Name</u>	<u>Type Treatment</u>	<u>Stream Name</u>	<u>Lbs PO₄</u>
Erie	39	Erie City M.S.A.	Activated Sludge	Lake Erie	6130
Albion	40	Albion M.A.	High Rate Trickling Filter (with aeration)	Connaut Creek	70
Fairview Boro	41	Fairview School	Extended aeration	Trout Run	7.0
Girard	42	Girard M.S.S.	Imhoff with Trickling Filter	Elk Creek	150
Lake City	43	Lake City M.S.S.	High Rate Trickling Filter	Elk Creek	120
North East	44	North East M.S.A.	High Rate Trickling Filter	Tributary to 16 Mile Creek	243.1
Erie		City of Erie Combined Storm & Sanitary Sewers			
	45	Canal Sewer (Sassafras Street)	None	Erie Harbor	199
	46	Cherry Street Sewer	None	Erie Harbor	295
	47	Mill Creek Tube	None	Erie Harbor	43
INDUSTRIAL WASTES					
North East	48	Walsh Grape Juice	Oxidation Ponds with Trickling Filter	16 Mile Creek	.01
Girard Twp.	49	Gunnison Bros. (Tannery)	Settling Ponds	Elk Creek	.68
Lawrence Park Twp.	50	General Electric Company	Settling & Acid Neutralization	Lake Erie	40

*3 pounds of phosphate (PO₄) is approximately equal
to 1 pound phosphorus (P)

<u>Erie County</u>	<u>No.</u>	<u>Case Name</u>	<u>Type Treatment</u>	<u>Stream Name</u>	<u>Lbs PO₄*</u>
Millcreek Twp.	51	American Sterilizer Co.	Treat for Cyanides	Ditch to Cascade Creek	.13
Fairview Twp.	52	Parker White Metal Company	Settling Ponds	Trout Run	1.4
Erie	53	Hammermill Paper Company	Settling & Screening	Lake Erie	None

Crawford County

Springboro	54	Albro Packing	Extended Aeration	Tributary to Conneaut Creek	11
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*3 pounds of phosphate (PO₄) is approximately equal
to 1 pound phosphorus (P)

W. A. Lyon

MR. STEIN: Are there any comments or questions?

Well, I have just one. If you would look at the first page of your report, Item 3, and this goes to the remarks that Mrs. Angel made that you have got to get the wastes to the plant in order to treat them.

You talk about bypassing the sewage in Erie. The plans will be submitted February 28, 1970; construction to start May 27, 1970. When is it going to be finished?

MR. LYON: I do not know. My guess would be that it would probably -- I am only guessing here, I do not know this for a fact -- I would assume that the construction would take between six months and a year.

MR. STEIN: I wonder if it would be possible to get that date?

I think the key date that the conferees are probably interested in, in Pennsylvania, is when the work is to be completed and in operation so we have something to check against.

MR. LYON: We will provide that information.*

MR. STEIN: Okay. Thank you.

Are there any other comments or questions?

If not, thank you very much, Mr. Lyon, for your report.

May we now call on the Federal Government, Mr. Poston.

*(See next page.)

COMMONWEALTH of PENNSYLVANIA



THOMAS W. GEORGES, JR., M.D.
SECRETARY OF HEALTH

DEPARTMENT OF HEALTH

P. O. BOX 90

HARRISBURG 17120

August 5, 1969

Mr. Murray Stein
Assistant Commissioner for Enforcement
Federal Water Pollution Control Administration
U. S. Department of the Interior
Washington, D. C. 20242

Dear Mr. Stein:

You will recall that you asked Mr. Lyon for the completion date for the Erie Interceptors. We have looked into this matter and find that there is a proposed Bay-front Highway which is causing complications.

The City of Erie has not made a commitment to a completion date because it claims the design of the sewers cannot be completed until the highway is designed. The highway plans have now been completed and made available to the City. Although it does not appear that funds are available for the highway construction we feel the City should be able to proceed with the design and construction of the interceptors.

Because of the reluctance of the City to proceed on this problem and their failure to take steps to eliminate discharges of raw sewage from other storm sewers and streams we are planning to hold a hearing very shortly. Investigations are being completed and testimony is being prepared at this time.

We will keep you advised of the status of this case.

Sincerely,

A handwritten signature in cursive script that reads "Larry S. Miller".

Larry S. Miller
Acting Director
Bureau of Sanitary Engineering

M. Gamet

MR. POSTON: Mr. Merrill Gamet will make a statement on Federal installations and, Merrill, I would ask that you keep this as brief as possible, and yet give us the meat of your report.

STATEMENT OF MERRILL GAMET, CHIEF,
FEDERAL ACTIVITIES COORDINATION,
FEDERAL WATER POLLUTION CONTROL
ADMINISTRATION, CHICAGO, ILLINOIS

MR. GAMET: Mr. Chairman, Conferees, ladies and gentlemen, my name is Merrill Gamet, with the Federal Water Pollution Control Administration, Great Lakes Regional Office and responsible for the pollution abatement at the Federal installations.

I have a short status report to present here, in addition to which there is an inventory accompanying the report which has been handed to the Conferees which contains more detailed information than will be given in the summary report.

(The above referred to reports follow in their entirety.)

STATUS OF COMPLIANCE
OF FEDERAL INSTALLATIONS
WITH THE RECOMMENDATIONS AND CONCLUSIONS
OF THE LAKE ERIE ENFORCEMENT CONFERENCE

Reports of progress made by Federal installations in the Lake Erie Enforcement Area with regard to compliance with the requirements of Executive Order 11288 and the Conference Summary have been made at each of the enforcement conference sessions. All major Federal installations have initiated plans for abatement of pollution, which when completed will insure compliance with enforcement conference recommendations. The following are statements regarding nine (9) installations in the above category; the first three (3) of which were reported last year and are still not in compliance, and with the remaining six (6) in various stages of completion of remedial measures:

Grosse Ile Naval Air Station, Grosse Ile, Michigan:

This installation has been reported on at each session of the Enforcement Conference. Facilities under construction at Selfridge Field are nearing completion, and the present target date for closing Grosse Ile and moving the operations to Selfridge Field is definitely fixed at August or September 1969.

U.S. Coast Guard, Detroit River Light Station:

Sanitary wastes from five (5) persons are discharged without treatment to Lake Erie. A request for funds has been submitted to the Congress to install an unmanned, automated navigation light. Present plans call for completion in 1971.

U.S. Coast Guard Station, Toledo, Ohio:

Sanitary wastes from twenty-one (21) persons are settled in a septic tank, the effluent from which discharges to Maumee Bay. An effort has been made by the City of Toledo to enter into a contract with the Coast Guard to

participate in the cost of an interceptor to carry their wastes to the City of Toledo. The Coast Guard requested funds for FY 1970 for this project, but were notified that the funds were not approved. Another request has been submitted for FY 1971. The Coast Guard plans to approach the City of Toledo regarding a long-term agreement for reasonable rent as a means of financing the project. As a result of the long delay, the Coast Guard has been requested by letter of June 11, 1969, to plan for the installation of interim facilities, such as, holding tanks, temporary pipelines or incinerator toilets, as a means to abate pollution of Lake Erie until permanent facilities can be financed and installed.

Selfridge Field, Michigan:

Force
The Air₄ has completed negotiations with Harrison Township to connect to the Harrison Township interceptor, which will carry Selfridge Field wastes to the Detroit interceptor. The Harrison Township interceptor is presently under construction. Bids have not yet been taken for the Clinton River crossing and lift station for the Selfridge Field force main. However, it is anticipated that the connection between Selfridge Field and the Harrison Township interceptor will be completed in January 1971. Wastes from Selfridge Field will be discharged to the Detroit system at such time as the interceptor is completed, presently scheduled for May 1971.

U.S. Army NIKE Sites 15 and 16, Selfridge Field, Michigan:

The Aerospace Defense Command has reported that an agreement has been reached with the Army to connect the waste discharges from the NIKE sites into the Selfridge Field force main and thence to the Detroit interceptor. No projected date for this connection is available at this time.

NASA, Lewis Research Center, Cleveland, Ohio:

Sanitary wastes are discharged to the City of Cleveland system. Industrial wastes from research and testing activities are adequately treated and monitored before discharge to the Rocky River. Research is under way to eliminate phosphates from cooling tower blowdown. Results from an experimental cooling tower have shown that phosphates in the blowdown waters can be eliminated by converting from high chromate-phosphate tower treatment to organic zinc. It has been reported that all cooling tower treatment will be converted to the zinc treatment not later than January 1970, although some phosphates may be discharged after that date, until all previous treatment chemicals are completely flushed from the system.

NASA, Lewis Research Center, Plum Brook Station, Sandusky, Ohio:

This installation has installed secondary treatment facilities with chlorination, and with chemical precipitation and pH adjustment capability for phosphate removal. Automatic chemical feeders have not yet been installed for full plant scale operation. Laboratory analyses have indicated that total phosphorous (as P) in the sewage treatment plant influent is 3.2 mg/l (2.9 lbs/day), and 2.7 mg/l (2.4 lbs/day) in the effluent without any additional treatment for removal of phosphates. Full plant scale tests are now in progress to verify evaluation of jar test results for phosphorous removal. It has been reported that the plant will have capability to remove phosphates to any predetermined level, based on established requirements.

Michigan Army Missile Plant, Warren, Michigan:

This installation has both sanitary and industrial waste treatment facilities. Secondary treatment plus chlorination is provided for the

sanitary wastes. Industrial waste treatment consists of conversion of cyanide and chromic acids to stable forms, followed by coagulation for removal of suspended solids and metals. Present treatment does not comply with the State of Michigan requirements for discharges to the Clinton River. Additional treatment or discharge to the City of Detroit interceptor system is required. An evaluation is presently being made of a consulting engineer report. FWPCA and the State of Michigan have recommended connection to the regional sewer system. No projected time schedule for remedial measures is available at this time.

Detroit Arsenal, Warren, Michigan:

This installation discharges its sanitary wastes to the City of Warren sewer system for treatment and disposal. Industrial waste treatment consists of conversion of cyanide and chromic acid wastes to stable forms, followed by coagulation for removal of suspended solids and metals, and discharge to a system of drains tributary to the Clinton River. A recommendation has been made to provide additional treatment facilities in order to comply with State of Michigan requirements regarding waste discharges to the Clinton River, or discharge all wastes to the Detroit regional interceptor system. Recommendations have also been made by FWPCA to: 1) provide permanent collection and treatment facilities for acid drainage from the coal storage area, 2) dispose of holding tank sludge by commercial contractor, 3) discharge boiler blowdown to the sanitary sewer instead of the storm sewer, 4) provide closer laboratory control over industrial waste treatment processes. Item 1 is programmed for FY 70 funding. Item 2 is in compliance. Items 3 and 4 will be accomplished by September 1969. A time schedule

will be established regarding other remedial measures when the decision is reached regarding provision of additional treatment facilities or connection to the Detroit system.

Installations in the conference area are surveyed as frequently as possible to insure continued compliance with conference recommendations, water quality standards and Executive Order 11288.

The Federal government will continue to work towards 100% compliance at the earliest possible date with all Federal and State regulations in the Lake Erie Enforcement Conference Area.

REMOVAL OF TOTAL PHOSPHORUS
FROM WASTE DISCHARGES TO LAKE ERIE
BY FEDERAL INSTALLATIONS

The total phosphorus (as P) contained in untreated waste discharges from major Federal installations in the Lake Erie Basin is estimated to be about 200 lbs. per day. Treated effluents from existing treatment facilities at these installations contain approximately 74 lbs. per day.

The remaining eleven (11) installations, as shown in the inventory report, are all relatively small, and have a total contributing population of about 1,200 persons. They are estimated to contribute a total of about 15 lbs. per day of phosphorus to Lake Erie.

The following information in tabular form shows data from the above mentioned major installations in the basin that generate phosphates, primarily from industrial processes, and the reduction that is achieved through their treatment processes.

Phosphorous Loadings
from Major Federal Installations
Lake Erie Enf. Conf. Area

Installation	Total P (lbs/day)		Present Removal (%)
	Untreated	Treated	
NASA, Lewis Research Center	8.0	8.0	0
NASA, Plum Brook Station	2.9	2.4	17.2
Michigan Army Missile Plant	1.4	.7	50.0
Detroit Arsenal	.5	.2	60.0
Selfridge Air Force Base	68.8	56.0	18.6
Naval Air Station Grosse Ile	14.5	14.2	2.08
Cleveland Army Tank Automotive Plant	100.0	0.5	99.5
	196.1	74.0	

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It will be noted that the Cleveland Army Tank Automotive Plant achieves almost 100% reduction of phosphorus by chemical coagulation, mixed media filtration and finally sand filtration.

At such time as Selfridge Field is connected to the Detroit interceptor, the direct phosphorus discharge to the basin will be eliminated. This phosphorus contribution of Grosse Ile Naval Air Station will also be eliminated when the station closes in September 1969.

When these reductions are effected, it is estimated that the remaining total phosphorus contribution from all Federal installations to Lake Erie will not exceed about 25 lbs. per day.

FEDERAL INSTALLATION SURFACE WATER DISCHARGES

in the

LAKE ERIE AND TRIUMPH BASINS

June 1969

Discharge Location (Agency & Location)	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
1. Coast Guard Aviation 23 Station Cleveland (Cuyahoga Co.)	Eastern- Lake Erie (La. Erie)	Secondary, chlorina- tion	100- 150	No data available	1.0	No	None		Used for National Guard Train- ing
2. Coast Guard Aviation 20 Station Cleveland (Cuyahoga Co.)	Eastern Basin (La. Erie)	Secondary	40	BOD - 25	1.0	No	Chlorination	None	3,000 GPD capacity extended aeration treatment plant; CC plans to install C ₁₂ facili- ties but has not established a time schedule.
3. Coast Guard Aviation 23 Station Cleveland (Cuyahoga Co.)	Cleveland Basin (La. Erie)	Secondary, chlorina- tion	27	BOD ₅ untreated - 680 treated - 25	0.8	No	Closer plant control		
4. Coast Guard Aviation 20 Station Cleveland (Cuyahoga Co.)	Western Bas- in (La. Erie)	Primary	21	No data available	0.8		Connect to City of Toledo sewer system.		Negotiations with City con- tinuing
5. Army AMC Site 02 Cleveland (Cuyahoga Co.)	Lake Erie	Secondary City Sewer	50 50		1.5		Chlorina- tion		

June 1969

INSTALLATION Agency & Location	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
WFO, Cont'd.									
U.S. Army Cleveland Army Tank- Automotive Plant Cleveland (Cuyahoga Co.)	-	Sanitary - to City of Cleveland	2600	-	350.0	-	-	-	
	Adams Creek (Rocky River)	Industrial: Chromium reduction, chemical precipita- tion, settling, filtration (sand and coal filters), chlorination, oil recovery and aeration; controlled dis- charge.	-	Sus. Solids & BOD - 0 Cr ⁶ - 0, Cr ³ - 0 Phenols - 0 Cu - 0, Pb - 5.2 Oil - none Total P (as P): Treated: 0.5 Untreated: 65.0 (100 lbs/day)	185.0	No	None	-	Principal activity involves fabricating and finishing of metal (aluminum and steel) vehicles (tanks); operations involve machining, welding, cleaning, anodizing, electro- plating, painting and assembly.
USDA Levis Research Center Cleveland (Cuyahoga Co.)	-	Sanitary - to City of Cleveland	3800	-	550.0	-	-	-	80% cooling water.
	Rocky R. (L. Erie)	Industrial: Controlled dis- charge	-	Cr ⁶ - less than 0.1 Cu.: less than 0.1 Cd.: less than 0.1 Total Phos. (as P) - 1.3 (8 lbs/day)	730.0	No	Phosphate reduction	Jan. 1970	Industrial wastes from research and testing activi- ties; wastes consist of cool- ing water, oils, hydrocarbon fuels; wastes are collected in basins at their source, treated as necessary (batch treatment with chemicals).

June 1969

POPULATION Density & Location	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
Cont'd.									
Rocky R. (Cleveland (Cont'd.))	Rocky R. (L.Erie)	Industrial: (Cont'd.)							passed through oil separators and discharged to retention basins for analysis prior to release to the Rocky River. Phosphates from cooling tower blowdown to be eliminated by converting from high chromate phosphate tower treatment to organic zinc.
	Abrams Creek (Rocky River)	Sanitary: HS Area - Secondary	1-2	Intermittent discharge	-	No	Replacement	7/30/69	HS Area facilities receive only intermittent use; plant is to be replaced with an incinerator toilet unit.
		RCL: Secondary	8	Intermittent discharge	0.08	No	None	-	
	Abrams Creek and Rocky River	Cooling water: Once-through systems; no addi- tives or treatment	-	City water; temp. change 2 to 5° F.	800.0	No	None	-	This cooling water is obtained from the City of Cleveland, is not given any further treatment, and is used on a once-through basis.

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INSTALLATION Agency & Location	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
PLUM CREEK Lewis Research Center Plum Brook Station Sandusky (Erie Co.)	Plum Brook (L.Erie)	Main sanitary treatment plant; secondary, chlorination (Chemical precipitation and pH adjustment capability provided, but not yet in operation)	650	BOD ₅ - 2.0 Sus/Solids-8.0 Total P (as P): Untreated: 3.2 Treated: 2.7 (2.9 lbs/day) (2.4 lbs/day)	108.0	No			Automatic chemical feeders not installed; results of jar tests for phosphorous removal being evaluated; full plant scale tests now in progress to verify jar test results and determine plant operational criteria.
		Research Nuclear Reactor: Controlled discharge (Cooling tower, retention pond, continuous monitor and automatic flow diversion facilities provided)	-	Essentially Lake Erie water quality	1,300.0	No	None	-	Discharge from reactor consists chiefly of untreated dilution water used to maintain acceptable radioactive levels; cooling water is less than 20% of total flow; all flows are continuously monitored for radioactivity; high level wastes are automatically diverted to retention pond.
	Surface drainage to Plum Brook	Test Site B-2: Secondary, polishing pond	8-10	-	0 (0.2 future)	No	-	-	New package type treatment presently being installed to replace inadequate septic tank-tile field system.
	Surface drainage to Plum Brook, trib. to (L.Erie)	Test Sites J & B: Secondary	J-0 B-10	(Secondary, polishing pond) secondary	0 0.2	No	None	-	J Site presently inactive; no industrial waste discharge from these sites.

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Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
CONTOUR Country & Location) State, Cont'd. Ohio Ohio Research Center State Rock Station Shelby, Cont'd. (Ohio Co.)	SPF Site: Sanitary - secondary, 85 chlorination Cooling water: 2 cooling towers	85	BOD₅ & Sus. Solids less than 10 mg/l Dissolved Solids - 200-300 mg/l	2.0 6.0 (blow-down)	No	None	-	Package plant capacity - 15,000 gpd Present cooling load approx. 20% of maximum.
CONTOUR U.S. Air Force Selfridge Air Force Base (Michigan Co.)	Sanitary: Secondary, chlorination	6,500	BOD₅ - 11) 90-96% Sus. Solids - 14) removal Total P: Untreated - 10.5 (68.3 lbs/day) Treated - 8.6 (56.0 lbs/day)	780.0	Yes	Connect to Detroit Area Sewerage System or provide advanced waste treatment facilities	Connection scheduled to be completed by 1/71; initiation of service by 5/71	USAF on 9/23/68 signed a contract with Harrison Township whereby the township will construct an underwater crossing to pick up the Base's wastes and convey them to the township's interceptor thence to the Detroit interceptor for treatment by the City of Detroit. Negotiations are in progress with Township officials to convey sanitary sewage from the north-west area of Selfridge AFB westwardly to the Detroit interceptor. It is planned that Carehart Housing sewage will discharge to Detroit interceptor by Jan. 1971.

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INSTALLATION Name & Location	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
U.S. Air Force Selfridge Air Force Base (Macomb Co.) Cont'd.	Anchor Bay (Lake St. Clair)	Industrial: (aircraft waste water) gravity oil separators	-	Oil: 0 to 12,000 BOD: 315 COD: 2,470 Total Solids: 3,300 Sus. Solids: 205 Total P - 75.0 (0.5 lbs/day)	6.5 to 14.5; 8.5 avg	No	Divert wastes from storm sewer to sanitary sewer; control of excessive oil from storm water runoff.	Contract awarded - 1/30/69 Const.: completed Aug. 1969	Industrial wastes project is presently 45% completed; project includes: 1) divert- ing all aircraft washing and maintenance wastes from the storm sewer system to the sanitary sewer system for treatment, 2) the installa- tion of a floating oil boom and belt type skimmer at the lagoon on the northeast side of the Base to collect oils from storm runoff and prevent them from entering the lake, and 3) install baffles and a belt-type oil skimmer in the storm water pump station on the south side of the Base.
U.S. Navy Naval Air Station Grosse Ile (Wayne Co.)	French- man's Creek (Detroit River)	Sanitary: Primary, chlorina- tion	500 - 2500 (varies) 1200 avg.	BOD - 58 Sus. Solids - 33 Total Phosphorous: (as P) Untreated: 10.2 (14.5 lbs.) Treated: 10	135.0 to 260.0 170.0 avg.	Yes	Secondary, phosphate reduction	Base is scheduled to be closed in Sept. 1969	Combined sewer system; Base population varies with maxi- mum pop. on weekends when Navy Reserve personnel are training. Deactivation of the Base is dependent upon the completion of construction of facilities for the Navy at Selfridge AFB.
		Industrial: (aircraft wash water) None		Oil - 51 Total solids - 840 Sus. solids - 11 Total P - ?	16.0	Yes	Cease aircraft washing or connect to Grosse Ile municipal sewer system	Sept. 1969	Aircraft washing will be terminated when Base operations are transferred to Selfridge, AFB

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INSTALLATION (Agency & Location)	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
U.S. Army Detroit Arsenal Warren (Macomb Co.)	-	Sanitary wastes to City of Warren	7700		450	-	-	-	U.S. Army Tank-Automotive Command Headquarters located at Arsenal.
Bear Creek Industrial: to Red Run (Clinton River)			-	pH - 7.0 - 7.5 Total P Untreated - 3.2 (0.5 lbs/day) Treated - 1.2 Others - no data avail- able.	20.0	No	Closer laboratory control	Initiation of needed analyses 9/69	Plant activities: Assembly line production of tanks; welding, machining, cleaning, painting, plating, and assembly; significant research activities are also performed regarding various military vehicles. Present level of production is very low.
Boiler blowdown (to storm sewer) None			-	No data available	?	No	Divert to sanitary sewer system	Construc- tion completed by 9/69	
U.S. Army Michigar Army Missile Plant, Warren (Macomb Co.)	Moore Drain (Clinton River)	Combined Wastes, (Sanitary, Industrial, blowdown, and storm water) primary in a large lagoon; controlled discharge		**pH - 7.3 Sus. Solids - 6 BOD ₅ - 2.5 BOD ₂₀ - 11.3 Total PO ₄ - 1.06 (38.8 lbs/day) Oil - 1.28; Cu - 0 Cr ⁶ - 0.18; Cu - 0 Fe - 0.44; Zn - 0	* 4,300 (varies with runoff)				*represents the daily volume of flow discharged from final treatment facility in Nov. 1968; all wastes, including the effluents from the sani- tary and industrial waste treatment plants, boiler blow- down and storm water are dis- charged to the lagoon which is pumped out as conditions in the local drainage channels permit. **Nov. 1968 data Engineering study of waste discharges completed in Jan. 1969. Additional analy- ses required to determine treatment needs.

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Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
INDUSTRIAL (City & Location)								
INDUSTRIAL, Cont'd.								
U.S. Army Missile Army Missile Plant, Warren (Macomb Co.) Cont'd	Sanitary: Secondary, chlori- nation, thence to holding lagoon	3900	BOD ₅ - 10.9 BOD ₂₀ - 43.0 Sus.Solids - 9.8 Total Sol. PO ₄ : Untreated - 8.5 Treated - 4.9 Total PO ₄ : Untreated - 9.2 Treated - 5.3 Total P Untreated - 3.1 Treated (4 lbs/day) Treated (2.12 lbs/day)	150.0	No			
	Industrial: pH treatment, chemical precipitation, cyanide destruction and conversion, flocculation, clarification, chlorination, thence to lagoon	-	Temp. - 56° F pH - 7.6 Total Cr. - 0.30 Zn, Cu, Ni, Cn - 0.0 Total phosphorous - P Untreated - 0.32 Treated (1.4 lbs/day) Treated - 0.15	526.0		Further Chromium Reduction	Immediate- ly	
	Boiler blowdown: None except at holding lagoon	-	(As discharged to lagoon) temp. - 71° F; pH - 7.8 Total P - 5.3 Sus.Sol. - 45.0	3.1	No			

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INSULATION Agency & Location	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
Continued, Cont'd.									
U.S. Army WHE Site D-06 C & L Lima (Macomb Co.)	(Clinton River)	Secondary (ST & SF)	150	No data available	15.0	No	Chlorina- tion	None	
U.S. Army WHE Site D-57 L Newport (Monroe Co.)	Swan Cr. (L. Erie)	Launch Area: Secondary	75	No data available	5.0	No	None	None	Septic tank - subsurface sand filter system. This site is to be deactivated by Dec. 1969
57 C & X		Housing and Control Areas: Secondary	125	No data available	12.0	No	Chlorina- tion	None	Housing facilities occupied by Navy personnel
U.S. Army WHE Site 87 C & L Union Lake (Oakland Co.)	Union Lake (Huron R.)	Secondary (ST & SF)	125	No data available	12.0	No	Chlorina- tion	None	
U.S. Army WHE Site 61 L Rondulus (Wayne Co.)	Willow Run (Huron River)	Secondary (ST & SF)	125	No data available	12.0	No	Chlorina- tion	None	
U.S. Army WHE Site D-15-16 Selfridge AF Base (Macomb Co.)	Storm sewer to Clinton River	Maintenance Area: Secondary (ST & sand filters)	50	No data available		No	Connect to Selfridge AF Base sewerage system	Eliminate discharge by 1971	
	Swamp, thence to Clinton River	Headquarters Area: Secondary (ST & SF)	200	No data available		No	"		
	Clinton River	Launch Area: Secondary (ST & SF)	75	BOD ₅ - 11 Sus/Sol. - 73 Total P - 13.0 Tot. Coliform - 7,000/100 ml	5.8	No	"		

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INSTALLATION (Agency & Location)	Receiving Waters (Basin)	Treatment Provided	Est. Pop. Served	Discharge Characteristics (mg/l)	Present Flow (1000 GPD)	Affect Lake Erie Water Quality	Improvement Needs	Remedial Program	Remarks
INDIAN, Cont'd.									
U.S. Coast Guard Detroit River Light Station	Lake Erie	None	5	Raw sewage	0.3	No	Secondary, Eliminate chlorination or elimina- tion of dis- charge	Eliminate discharge by Dec. 71	Coast Guard plans to unman and automate the light during 1971; previous attempts to provide an automated light at this location proved unsuc- cessful; an automated light structure was constructed several years ago, but was destroyed by ice.

FEDERAL ACTIVITIES
REVIEW OF CORPS OF ENGINEERS PUBLIC NOTICES

A summary presenting the status of significant dredging and fill projects to which we had objected in the Lake Erie Enforcement Conference Area was prepared and submitted to the Conferees at the progress evaluation meeting on June 4, 1968. The following is a presentation of further information concerning certain projects for which information was incomplete at the time of the last report, and similar projects for which applications for permit have been filed with the Corps of Engineers, Buffalo District, since that time.

Projects reported, June 1968:

1. Great Lakes Dredge and Dock Co. To dredge in Buffalo Outer Harbor, Union Canal, Erie Basin and Lackawanna Canal at Buffalo. Analyses of samples contracted by applicant were never received. No permit was issued. The Corps of Engineers reports that the applicant finally decided to deposit the entire amount of dredged materials on their own property. This was reported by letter from the applicant to the Corps.
2. Erie Marine, Inc., Division of Litton Industries. To dredge in the slip between the Pennsylvania Coal Dock and Dequesne Pier, Erie Harbor, Erie, Pennsylvania, and dump in Lake Erie. Mr. Stoddard wrote a letter indicating that the dredging permit should contain specific qualifications with respect to the disposition of the polluted overburden. The Corps of Engineers reported that no permit was issued.
3. U.S. Steel Corporation. To dredge in the main channel Black River, Lorain, Ohio, and dump in Lake Erie. It was previously reported that, because of our objection, the applicant proposed to dump the dredgings on 3.5 acres of

their own property. This proposal was accepted by FWPCA. However, in February 1969, the applicant submitted another request to dump in Lake Erie, probably because two other applications for permit had been approved by action in Washington. We reiterated our position of one year previously. The applicant finally voluntarily withdrew their application.

Applications for permit - FY 1969:

1. Great Lakes Dredge and Dock Co. To perform maintenance dredging in Ashtabula River at Pennsylvania R.R. Co. Coal Dock, and dump in Lake Erie. We objected. Corps of Engineers requested additional information to support anticipated court action. Complete details were provided. This matter was submitted to the Chief of Engineers and a permit was finally issued over our objections dated Dec. 2, 1968, based on a letter of approval from Under Secretary Black.
2. Baltimore and Ohio Railroad (Permit application May 10, 1968). To dredge 40,000 cubic yards of material in its coal dock slip, Lorain, Ohio. Samples were collected by the Lake Erie Basin Office and analyses revealed pollution. FWPCA objected to dumping in Lake Erie. Applicant objected to our results, and subsequently more samples were analyzed and found to be moderately polluted. In addition, Congressman Mosher wrote Secretary Udall pleading the applicant's case, and requesting favorable consideration. The matter was finally resolved at the Washington level, by letter from Under Secretary Black, dated January 15, 1969, in which no further objection was made. Permit was issued January 29, 1969, over our objections.
3. Republic Steel Company. (Permit application Jan. 23, 1969). To dredge two areas in the Cuyahoga River adjacent to their property, and dump in Lake Erie. Quantity to be dredged not stated. Samples revealed gross pollution. FWPCA objected. This matter was finally resolved after the

Corps of Engineers offered the applicant the opportunity to participate in the cost of the Corps' diked area in Lake Erie off Cleveland Harbor and thereby become a part owner with permission to dump a stipulated amount of dredged material. Applicant finally accepted the offer and a permit was issued on April 14, 1969.

4. Jones and Laughlin Steel Company. (Permit Application March 12, 1969).
To dredge 8,500 cubic yards of material at its dock in the Cuyahoga River and to dump in Lake Erie. Sample analyses revealed gross pollution. FWPCA objected. The applicant finally agreed to participate in the cost of the Corps of Engineers diked area off Cleveland Harbor. Permit was issued April 14, 1969.
5. U.S. Steel Corporation. (Permit application March 12, 1969).
To dredge 3,000 cubic yards of material at its dock in the Cuyahoga River and to dump in Lake Erie. Sample analyses revealed gross pollution. FWPCA objected. Applicant finally agreed to participate in the cost of the Corps of Engineers diked area off Cleveland Harbor. Permit was issued April 21, 1969.
6. International Salt Company. (Permit application February 5, 1969).
To dredge 3,000 cubic yards in its slip in Old River at Cleveland, and to dump in Lake Erie. Sample analyses revealed gross pollution. FWPCA objected. The applicant was offered the same opportunity as others to participate in the cost of the Corps of Engineers diked area off Cleveland Harbor. Applicant has indicated willingness to sign, but has not yet done so. Permit has not been issued as of this date.
7. Erie Lackawanna Railway Company. (Permit application March 14, 1969).
To dredge 1,500 cubic yards of material at its dock in Old River, about

0.3 mile above confluence with Cuyahoga River, Cleveland, Ohio.

Samples were collected at two points in the area. Those at the downstream point were found to be grossly polluted, and at the upstream point were moderately polluted. FWPCA objected to granting the permit. This applicant was also offered the opportunity to participate in the cost of the Corps of Engineers diked area, and has indicated a willingness to sign, but wishes to delay until after July 1, 1969. Permit has not been issued to date.

Applications for permit to fill in Lake Erie:

1. Gordon Park, Cleveland, Ohio. This project was reported on in June 1968, indicating our objection to the fill operation. A permit for this project was not issued due to FWPCA objections. However, the city submitted another permit application, dated December 18, 1968, about which we had no knowledge, until receipt of a letter from the city, dated June 2, 1969. The city now states that they are complying with all regulations regarding dike construction and dumping of fill materials into the diked area. We have not taken any action on this letter to date, since we have had no request from the Corps of Engineers to do so.
2. Associated Estates Corporation. (Permit Application February 6, 1969). To fill approximately 25,000 cubic yards of shale and rubble in Lake Erie. This material is waste excavated material from the site of a high rise apartment building. FWPCA objected on the basis of Recommendation 14 of the Lake Erie Enforcement Conference. He appealed to his Congressman. A meeting was held with the applicant and his associates in Cleveland on May 2, 1969, with the Regional Coordinator, and representatives of BOR, BSF&W, and State of Ohio. The matter was finally resolved that the applicant would remove the material and dispose of it in a location other than dumping in Lake Erie. The permit was not issued.

COMBINED SEWERS IN FEDERAL HIGHWAY AND URBAN RENEWAL PROJECT
AREAS IN THE TOLEDO, OHIO AREA

Information was received in January 1969 from the Director, Lake Erie Basin Office, that Bureau of Public Roads and Housing and Urban Development projects are being built in the Toledo, Ohio area without following the Lake Erie Enforcement Conference recommendation for sewer separation, and subsequent orders by the Ohio Water Pollution Control Board. It was further reported to him that the State and Federal government have relaxed on the requirement.

Requests were sent to the respective Federal agencies by letter dated March 6, 1969 for information regarding their present practices (copies attached). BPR replied on April 2, 1969 (copy attached) and stated that they had made a review of all active construction projects in the Toledo area, and found them to be in compliance with their Instructional Manual 20-2-67, but admitted that there are cases where combined sewers are being replaced in kind, and that this would not jeopardize separation of the sewers at a later date.

A reply was received from HUD, dated May 5, 1969 (copy attached), which indicated that from the Urban Renewal Handbook it is generally considered preferable to separate combined sewers, but it is not mandatory. It is further stated that combined storm and sanitary sewers are eligible in accordance with the Handbook, if there is adequate provision for treating the combined effluent, although, wherever there are long range comprehensive sewer plans providing for the separation of combined sewers, sewerage construction in Urban Renewal served by such systems must provide separate systems.

We believe that the practices of both agencies are not in compliance with the enforcement conference provisions.

We plan to request that representatives of the above mentioned Federal agencies meet with us at a mutually agreeable time and place as soon after the date of this conference as possible to resolve this problem and to reaffirm our position.

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MR. POSTON: I would like to ask one question here, Mr. Gamet, and that is: You have given us a report on nine particular installations.

MR. GAMET: Right.

MR. POSTON: And I am wondering whether they are in compliance with the schedule as set by the Conferees in 1967. I think it is.

MR. GAMET: I would say that --

MR. POSTON: And which ones are not, if they are not in compliance?

MR. GAMET: Well, the three that I first mentioned: The Grosse Ile Naval Air Station; the U.S. Coast Guard, Detroit River Light Station; and the Coast Guard Station at Toledo are not in compliance. I mentioned this at the beginning of the report.

The other installations, with the exception of two, have time schedules already fixed. The two that do not have time schedules are the Nike Sites at Selfridge Field, the Michigan Army Missile Plant -- there are three -- and the Detroit Arsenal. A part of the deficiencies have been remedied and are now in compliance, and a part of them are not.

Now, two of these, as I mentioned, are dependent upon a decision based on consultants' reports, as to the feasibility of additional treatment facilities, or

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transmission of wastes to the Detroit interceptor system, and I mentioned that both the State and ourselves have recommended connection to the Detroit system.

MR. POOLE: Well, they are not in compliance yet, then, are they?

MR. GAMET: No, not on that basis.

MR. POOLE: I want to suggest to the Chairman that the next time you make a table up there, put the Federal installations on. I don't think they look a bit better than the States do when you put this report on it.

MR. POSTON: I think the reason I brought this out is that our Chairman indicated at the beginning of the meeting that this was a progress meeting in which we were going to evaluate the progress that has been made, and I am having difficulty knowing exactly what the progress has been up to this time.

We have heard reports that indicated some of the dates had been extended. We had heard about some new plans, for example, on the Cuyahoga River, where they may go into the city system or they may go their own way. We have heard about advanced waste treatment where advanced waste treatment means just phosphate removal, and in some places we find that phosphate removal is considered chemical treatment alone, and we have heard

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reports on research.

But I think we came here to find out what the progress is and evaluate that progress as compared to the dates which these same Conferees gave to the Secretary, and which the Secretary of the Interior said was the schedule for abatement of pollution. These dates were set in 1967, I think, this schedule for abatement, and now we come along with all these different things, and I am really interested in finding out how we are meeting this schedule. Are we meeting the schedule? Is this thing going along just like we planned it, or are we given a research project as a diversionary tactic, or these other things as diversionary tactics? And this is what concerns me, and this is why I asked the question of you, Merrill. I think we are getting ourselves in the same position.

MR. STEIN: Mr. Metzler.

MR. METZLER: I wasn't sure from this speech that the Federal Conferee was making whether he was directing himself to the Federal report, or whether he didn't understand the reports he has gotten from the States. I can speak only for New York, but I think it is very clear in the report that we presented at least where we are meeting the schedule and where we are falling behind. If there is any doubt in his mind about it, I

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would be glad to ask Mr. Seebald to review it again.

MR. STEIN: I think it is pretty clear, as I see it. As a matter of fact, I have a few points here that I would like to raise with the Federal report.

You know, I was once in a situation like this out in, I think, Wyoming, and I think they operated a little differently than that. It just got to about this point in the discussion and, at that time, the health officer of Wyoming who was in the west a long time said, "You know, this reminds me of when the west was really young, and I was a boy, and I went into the town and was in the parlor in a local house of ill repute, and I saw two of the girls there arguing with each other, and the argument was: Which one of us is more respectable?"
(Laughter)

The point is, though, we do have dates, and these dates have been established, I think, for the program. We had a question on the phosphate date. There wasn't quite clarity, I don't think, on when we wanted to have a date for the removal of phosphate.

We haven't taken that up yet. But I do think with the dates that we had originally and the dates you had proposed here, it doesn't take much for a man like me to say: If we originally set a date for 1970, and someone said that they were going to complete that in 1971, or something, in June, they were six months behind,

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maybe that wasn't too significant. If they said they were going to complete it in 1972, they were a year or a year and a half behind. But if they said they were going to complete it in 1973, they might be three or four years behind, and I think you have to evaluate this project by project.

Again -- and I know a lot of you people here are professionals, because you are following this kind of arrangement. I don't think there is anything to be ashamed of or anything unusual here. When we first set this program up, we were dealing with one of the largest and major pollution problems in the country, a tremendous body of water such as Lake Erie, with very complicated problems: five States, many industries, many cities. You can tell from the listings you have had here.

From all of these, we came up with the same time schedule. For all of the people at the head table and I am sure most of you people who are in the room know when any regulatory agency in pollution control sets up a schedule like that at the beginning, the reason we have these periodic meetings is to see what develops and make adjustments accordingly where there is good reason to make the adjustments.

I have never been in a single case yet where we have set this for a large group of people, as cities

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and industries, for everyone to be completed on a date certain like January 1, 1970, that suddenly January 1, 1970, comes and 40 cities and 60 industries push the button all at the same time and the plants go into operation.

You have to recognize that originally we made the best estimate. I see here we are not too far off on the dates. However, Mr. Poston, let me call your attention to two factors. I noticed the date from every city and every industry in the State — two things disturb me and they may not be large sources, but one is U.S. Army Nike Sites 15 and 16, where they show "no projected date is available at this time;" and the other the Michigan Army Missile Plant at Warren, Michigan, "no projected time schedule for remedial measures is available at this time."

Now, I think in the absence of that perhaps the Federal report is beyond the State report, because we have two sources where we have no date at all.

MR. GAMET: Mr. Chairman, may I answer that?

MR. STEIN: Yes.

MR. GAMET: In the first place, we have notified every Federal agency as to the expected dates of compliance in accordance with the Conference recommendations and the State requirements. However, these are installations which are Department of Defense installations, and I

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believe we all understand what happens at times to Department of Defense funds. We have experienced several instances recently where funds for waste treatment facilities have been diverted to other uses, which simply means this, then: that the waste treatment or remedial measures are going to be postponed. We are working as hard as we can to get every single Federal installation in our region at full compliance with all requirements: Executive Order, Water Quality Standards, and the Conference Recommendations.

MR. POSTON: I think, in answer to Mr. Metzler's question -- and I haven't noted this in Mr. Metzler's report, because I guess I couldn't absorb all of the information that is in all of the reports -- but I see here in the Maumee River Basin, for example, and it says Adelphis, plan extended. They extended the time schedule. For the next community, which was Toledo, the date for detail plan is extended. Van Wert, date for detail plans extended. Antwerp, date for detail plans extended.

MR. METZLER: Mr. Chairman.

MR. POSTON: And this is what I was referring to.

MR. METZLER: I want to clarify a point.

I wasn't sure -- my question was primarily: Was the Federal Conferee referring to the report that was

before us by the man at the podium, or was he saying he was dissatisfied with some of the data submitted by the States, and he has answered that by saying that he is dissatisfied by the data submitted by some of the States.

MR. POSTON: I am dissatisfied with our own Federal agency report. As an illustration -- our particular inadequacy at this time emphasizes what has been going through my mind today as to how, as one of the conferees, I am going to participate in a decision for the Secretary. How can we come up with a report to the Secretary that will tell what progress has been made? How will we evaluate this?

MR. METZLER: I merely say that if there is any question about the New York presentation, I hope it will be highlighted and we can straighten it out.

MR. EAGLE: Mr. Chairman, I have a question.

In this table, Mr. Gamet, you have a column "Affect Lake Erie Water Quality." In going through this, I find only three out of the total list is answered "Yes." All of the rest are answered "No."

What was the basis for this determination?

MR. GAMET: Well, I think the basis was either that there is adequate treatment, or that the flow was of such magnitude, or the point of discharge to the tributary stream was such that there would be essentially

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no deleterious effect on water quality in Lake Erie.

MR. EAGLE: Well, you certainly didn't give the State of Ohio this prerogative to decide whether or not it would have any effect on Lake Erie. You included everybody, per se.

If this were the case, I don't even know what Indiana is doing here, because they are a long way from Lake Erie.

MR. MILLER: Thank you, George.

MR. EAGLE: That is not germane to the discussion here at all today, that column.

MR. STEIN: Are there any other comments?

MR. LYON: Mr. Chairman, I think one comment needs to be made here. It came up earlier in the discussion, and it troubles me, and that is the fact that it appears, in some cases -- one of them perhaps being the Cuyahoga River -- we have been given schedules which may, in fact, not be the course of events that might be followed.

The individual industries have provided schedules for abating their pollution from their individual discharges, but it appears from the report of the city of Cleveland that they are considering collecting some of these or all of them into an industrial waste or into their sewer system.

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If this is so, then, wouldn't it also appear appropriate for that plan to be related to some kind of a schedule? In other words, if it is possible to follow two courses of events, then oughtn't there to be two schedules for either possibility?

MR. POOLE: Well, Mr. Chairman, I thought that was brought out this morning that it was impossible to, at this moment, set a schedule on when the city of Cleveland might collect some of this industrial waste, but that it would be considered as soon as Cleveland had proceeded to the point where it could be. Did I misunderstand, George?

MR. EAGLE: No, I thought I fully answered that question. I don't know whether Walt was here at that time or not.

MR. LYON: Well, I think we should realize, then, that we really don't have a schedule for that possibility.

MR. EAGLE: No. It is only in the discussion stage at this point. There is no proposals in this regard.

MR. STEIN: I think -- and let me again say -- I tried to summarize this, this morning. Ohio and Mr. Eagle have dates set for these industries in the Cuyahoga River, according to his report. These dates remain unchanged for compliance is that correct?

MR. EAGLE: That is right.

M. Gamet

MR. STEIN: Right. And there is no proposal before Ohio to change the dates there.

MR. LYON: Does that mean that if the city takes these industries into a regional system that the same schedule will pertain and the schedule will not be changed?

MR. EAGLE: I don't know, Walter. I don't know what is going to happen. I don't know. I can't tell you what is going to happen a year from now. I can't even tell you what is going to happen tomorrow really.

MR. STEIN: Do we have any more?

MR. POSTON: To get back to the Federal report, I see that we indicated back at an earlier date that we were going to have all of the Federal installations with the exception of the NASA Lewis Research Center to be in compliance by August of 1966. That means that all of these are in noncompliance with the exception of the NASA Research Center.

MR. GAMET: Well, I don't believe that is correct, mainly because -- with the possible exception of phosphate removal --

MR. POSTON: In June of 1966, the summary of our meeting was that Federal installations -- all but one major Federal installation will have the necessary treatment facilities completed and in operation by August

M. Gamet

of 1966. The NASA Lewis Laboratory at Sandusky, Ohio, not in compliance with Conference Recommendations has engineering studies under way.

MR. GAMET: Well, the others that I have mentioned here, such as Selfridge Field, Nike Sites at Selfridge, have not been in compliance with the State of Michigan requirements for discharges to the Clinton River. As you know, they now have specific plans, which has been State Recommendation and ours, to discharge their waste to a municipal system where feasible.

This, of course, is now going to happen. As of this date, they are not in compliance until such time as the Detroit interceptor is available in that area for connection to it.

MR. POSTON: It is quite probable and possible that Selfridge was not considered since Selfridge Field is up above Lake St. Clair, tributary to St. Clair through the Clinton River, as I understand it.

MR. GAMET: Well, it discharges into St. Clair -- that is, the Clinton River -- but we were given to understand that Lake St. Clair is included within the Conference area. This was the reason why we have included that installation in this report.

MR. STEIN: Any other comments or question?

Does that conclude the Federal report?

M. Gamet

MR. POSTON: Mr. Gamet, you have another statement?

MR. GAMET: Well, I do have a short statement here regarding phosphate removal which I can give in two or three minutes.

MR. STEIN: Go ahead, Mr. Gamet.

(The above referred to report follows in its entirety.)

REMOVAL OF TOTAL PHOSPHORUS
FROM WASTE DISCHARGES TO LAKE ERIE
BY FEDERAL INSTALLATIONS

The total phosphorus (as P) contained in untreated waste discharges from major Federal installations in the Lake Erie Basin is estimated to be about 200 lbs. per day. Treated effluents from existing treatment facilities at these installations contain approximately 74 lbs. per day.

The remaining eleven (11) installations, as shown in the inventory report, are all relatively small, and have a total contributing population of about 1,200 persons. They are estimated to contribute a total of about 15 lbs. per day of phosphorus to Lake Erie.

The following information in tabular form shows data from the above mentioned major installations in the basin that generate phosphates, primarily from industrial processes, and the reduction that is achieved through their treatment processes.

Phosphorous Loadings
from Major Federal Installations
Lake Erie Enf. Conf. Area

Installation	Total P (lbs/day)		Present Removal (%)
	Untreated	Treated	
NASA, Lewis Research Center	8.0	8.0	0
NASA, Plum Brook Station	2.9	2.4	17.2
Michigan Army Missile Plant	1.4	.7	50.0
Detroit Arsenal	.5	.2	60.0
Selfridge Air Force Base	68.8	56.0	18.6
Naval Air Station Grosse Ile	14.5	14.2	2.08
Cleveland Army Tank Automotive Plant	100.0	0.5	99.5
	196.1	74.0	

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It will be noted that the Cleveland Army Tank Automotive Plant achieves almost 100% reduction of phosphorus by chemical coagulation, mixed media filtration and finally sand filtration.

At such time as Selfridge Field is connected to the Detroit interceptor, the direct phosphorus discharge to the basin will be eliminated. The phosphorus contribution of Grosse Ile Naval Air Station will also be eliminated when the station closes in September 1969.

When these reductions are effected, it is estimated that the remaining total phosphorus contribution from all Federal installations to Lake Erie will not exceed about 25 lbs. per day.

Hon. Charles A. Vanik

MR. STEIN: Any comments or questions?

If not, thank you very much, Mr. Gamet.

We have a telegram addressed to the Chairman which I would like to read into the record now.

"Urge your Conference to recommend separate Federal funding for Lake Erie pollution problem. A recommendation urging construction of diked areas for receipt of dredged materials would be helpful in my efforts with Army Corps of Engineers for long-term solutions of this problem. In separate statement* which I will submit, I protest the action of Ohio Water Pollution Control authorities in zoning water quality. Cleveland communities are entitled to no lesser water quality than other citizens of Ohio. Full statement will be submitted for the record." Signed Charles A. Vanik, Member of Congress.

I think Michigan called a couple of participants who didn't answer. Do you want to try again, Mr. Purdy?

MR. PURDY: Yes. I have a note that Mr. O'Keefe, representing the UAW, is now present in the audience and we are ready to hear his statement if he would come forward.

*Appended at the end of Conference Proceedings.

James O'Keefe

STATEMENT OF JAMES O'KEEFE, INTERNATIONAL
REPRESENTATIVE, UNITED AUTO WORKERS,
DEPARTMENT OF CONSERVATION AND RESOURCE
DEVELOPMENT, COLUMBUS, OHIO

Mr. Chairman, ladies and gentlemen, my name is James O'Keefe. I am an International Representative serving the United Auto Workers, Department of Conservation and Resource Development. I am here today on behalf of Director Olga Madar and the 160,000 UAW members residing in Ohio.

I am not a technician nor a professional water pollution control expert, but then neither are the citizens of the Lake Erie Basin that I represent.

In tribute to your expertise, first let me say that I am overwhelmed by the wealth of written material available today to attendants to this Conference. As a lay person interested in the problem of water pollution, I must confess, however, that I am confused. I am somewhat like the boy who dropped his chewing gum in the chicken yard and didn't know exactly what to pick up.

I have read reams of verbiage: The Lake Erie Environmental Summary 1963-1964, the Proceedings of the Conference dealing with Pollution of Lake Erie

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and Its Tributaries, the Lake Erie Water Treatment Cost Related to Water Quality, a Report on Lake Erie Bathing Beaches and Bacterial Water Quality, and even the Lake Erie Environmental Summary for 1963-1964. And I repeat, like that boy in the chicken yard, I am confused.

I am confused about the label given this meeting today. It is called a public hearing, but yet the agenda excludes the public. I am confused that the Chairman has seen fit to reaffirm that the cost of cleaning up pollution must be borne by the polluters. If this is so, what is the real role of the U.S. Department of Interior, and why the waste of time and taxpayers' money on this charade called a public hearing? Couldn't the information exchanged here today by representatives of State Governments have been transmitted by letter? Is this so-called public hearing a display aimed at quieting the public furor?

I know that Ohio is doing a very poor job on cleaning up the waters of the State. The bureaucrat would say this differently. He would say, for instance, that: "Ohio has made an effort but there has been some slippage." Further that he is convinced that Ohio will clean up its waters, but that the real question is when. The bureaucrat may go a step further and say that: "Ohio is doing

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as well as other States," and dispense with a criticism on the progress of Cleveland as compared to Detroit by saying that: "Detroit has a new Director."

Now, like most citizens of Ohio, I am fed up with gobbledygook. It has been adequately demonstrated that the people of Ohio are powerless to turn the tide of pollution of its streams, rivers, and lakes, and I therefore call for the Federal Government to perform the job of doing for the people of Ohio that which they cannot do for themselves: Restore to the citizens of Ohio their lakes and streams; give back to the people their heritage.

As starters, how about a complete and absolute prohibition on all drilling in Lake Erie and the other Great Lakes, followed by an Executive Order to the Corps of Army Engineers to stop, not next year, not next month, not tomorrow, but today, and stop, stop pollution by subsidy, stop dredging in Lake Erie.

These may sound like radical proposals, and they are, but the situation wherein the Cuyahoga River catches fire or a great city like Cleveland living on the shores of one-fifth of the country's freshwater supply is obliged to chlorinate lake waters for a safe swimming hole for its citizens calls for unusual responses from public officials.

The UAW is obligated by membership action to

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cooperate with all interested groups in the protection and enhancement of our environment. Today, to you gentlemen, I reaffirm that obligation. In return, could we possibly get a pledge from you of less talk, more action?

Thank you for allowing me the time to make these observations, and, if it pleases you gentlemen, I would like to submit some copies of this statement for inclusion in the record.

MR. STEIN: That will be done without objection.

I feel obliged though, Mr. O'Keefe, to make a comment on two of your remarks: one, that we held a meeting and the public wasn't invited. I think by your statement alone, besides all of the other public people who wanted to appear, that, on its face the public is invited. The Secretary said so in his letter to the States. We have made every effort for the public to be here.

Also, the statement allegedly made by the Chairman as to who is to pay for pollution, and that the Chairman said that just the cities and the industries responsible are to pay for it. The Chairman has no recollection of saying that. He never did say it. As a matter of fact, if you examine the congressional hearings,

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my testimony through the years for more construction grant appropriations, I think the record is very clear on where I stand on that in the development of State laws and State codes, on the promotion of State bond issues to get public funds into this.

What I did say was just a plain statement of the law of the land: that the people who produce the pollution are legally and technically responsible for its cleanup.

And let me make this clear. Whatever you say about the State of Ohio, or any other State, or even the Federal Government with its few installations, the State of Ohio isn't polluting your waters, it is the people in the cities and the industry in Ohio that is polluting them, and we can say the same for all of the other States.

MR. LYON: Mr. O'Keefe, what has the United Auto Workers done about asking the Ford Motor Company to have its pollution of the Cuyahoga River cleaned up sooner?

MR. O'KEEFE: Well, let me ask you a question. What has the Water Pollution Control Administration done about the pollution of the Cuyahoga River? I think we are in the same situation.

The Chairman has said that the people of Ohio are responsible for the pollution of its waters. I say that this is not so. I say that there have been a few

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privileged people throughout the State that have taken it upon themselves to use a natural resource without paying the cost for the resources, and I think that we have sat through meeting after meeting.

My reference to the public being at these meetings -- I notice that there is no chance for response from the attendants to these meetings. There is only -- if you submit your name beforehand, you are allowed a chance to speak, and I notice that the scales are weighed in favor of the professionals. There is very little response from the general public, the people that are confronted with this problem.

People in Ohio don't have places to go swimming. The Cuyahoga River is a national disgrace, and I read years ago about a congressional committee that come down in helicopters and they flew over the river, and there was a great big public outcry, and there was responses from the Federal Government, and the State Government and the City Government. But it is common knowledge in the State of Ohio that there has been no progress, and all we do is come together every June, it seems, to get a report on no progress, no progress, further reasons for nothing being done.

I am telling you that the people of Ohio are fed up and disgusted with the situation, and if the public

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officials aren't going to do it for us, we have to call upon the Federal Government to do the job that should be done by our public officials in the State. The State has been deficient. We have no money allocated for water pollution. When I say money I mean the kind of money that would do the job effectively.

We have allowed polluters to use our natural resources and not pay the cost of the resources. We have denied the children and the people of Ohio the things that we have a right to, by virtue of being a citizen of this great State, have.

Now, "profit" is not a dirty word in the great State of Ohio. Evidently "pollution" is not also.

MR. LYON: Mr. O'Keefe, you didn't answer my question.

MR. O'KEEFE: If you answer my question, I will answer yours.

MR. LYON: I asked you first.

MR. O'KEEFE: I will tell you what they have done. They have applied pressure on the major industries where we have representation to stop polluting the streams, the lakes, the air, the natural environment and we have a clause in our agreement that calls for a strike. It gives us the right to strike when working conditions are abnormal. I wouldn't be a bit surprised in the very near

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future to see this become one of the programs of labor throughout the country.

If the natural resources aren't properly protected by the public officials that are charged with this responsibility, why then, perhaps it would call for more radical action on the part of united labor.

MR. LYON: Well, Mr. O'Keefe, the schedule submitted by the State of Ohio on the Cuyahoga River -- there are only two industries that are going to wait as long as 1971, and one of them happens to be the Ford Motor Company. Now, what I would like to know is what has your union done to get the Ford Motor Company to clean up its pollution as soon as some of the other polluters?

MR. O'KEEFE: Just for the record, and for you: The Ford Motor Company hasn't given James O'Keefe the keys to the front door, and we don't enter into the decisions of management. The only thing we can do is exert some kind of influence or pressure that is dictated by the desires of our membership.

MR. LYON: All I want to know from Mr. O'Keefe is: What did you do? Did you write a letter? Did you talk to somebody specifically? Could you tell us what you did?

MR. O'KEEFE: Yes. I will start back in 1967. In 1967, the UAW, at a convention in Atlantic City,

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organized the Department of Conservation and Natural Resources, and as part of their program they have contacted employers that they have contracts with, and asked them to honor the local State and Federal laws relating to pollution of natural resources. There is not too much more than that we can do.

MR. LYON: Well, did you take the time, on at least one occasion, let's say, to write a letter to the Ford Motor Company in connection with the pollution at Brook Park, which goes into the Cuyahoga River, which is polluting Lake Erie, which you are so concerned about? Did you take time to at least write a letter to them?

MR. O'KEEFE: Personally, no, I did not. But I know it has been done.

MR. LYON: If you didn't, what did you do? Did you do anything specific?

MR. O'KEEFE: I have done whatever I could do within the limits of the law.

MR. LYON: Well, what did you do?

MR. O'KEEFE: Well, I might be telling you something out of school, but I am interested in seeing that all kinds of pollution is stopped, just as I imagine that you are. What we have done is activate our membership because we are limited to our fields of action. We have activated our membership and educated them on

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some of these problems of the environmental problems, and urged our membership to take part in citizens' groups and organizations within their own community that are battling for improvement in the -- or battling for enhancement of the natural environment. This is what we have done.

MR. LYON: All I am trying to point out here, Mr. O'Keefe, is that it is very easy to complain about pollution. But we are all polluters, too, and we all have a responsibility, and I think we all agree on that.

MR. O'KEEFE: Well, your statement is well taken, and your point is well made, I think. I think we are all a part of the society, but I think you have missed the point that I have made. The point that I made in my statement was that Ohio has failed miserably in correcting problems of water pollution, and it is obvious to me and it is obvious to the membership of the UAW that the present arrangement will not work.

The people have insisted and asked for higher qualities -- higher water qualities. They have not received them. It is obvious that the present arrangement won't work.

Government is supposed to provide for the people those things that they can't provide for themselves, and I say to you and to this assemblage that this whole

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question of water pollution is beyond the realm of the average citizen, and it demands immediate action on the part of the Federal Government.

MR. STEIN: Are there any other questions or comments?

If not, thank you very much.

MR. O'KEEFE: Thank you.

Mr. Purdy.

MR. PURDY: On behalf of the State of Michigan with respect to the UAW, they have had a very active program in Michigan. They have given us a great deal of support and cooperation, and we are very encouraged by it.

A few years ago, on the United Action for Clean Water Conference they organized their membership at local levels and it has been a productive organization.

Also, I think, for the record, with respect to this being a public hearing, I think that at least I should indicate that we did in Michigan write specific invitations to eleven municipalities, and township units of government, twenty-one industries, and seventeen organizations. to participate in this meeting today. So we did attempt to inform the public in Michigan and give them an opportunity to appear.

Now, I called on the Lake Erie Cleanup Committee

this morning, and I am wondering if, at the present time, there is a representative of the Lake Erie Cleanup Committee that would like to make a statement?

That is all.

MR. STEIN: If not, I think we are completed with the detailed reports.

Now, the next item I have here was detailed reports on removal of total phosphorus.

I think we may have largely covered that, but if any of the States want to say anything in addition on phosphorus, at this time, I will call the roll.

Indiana.

MR. POOLE: No.

MR. STEIN: Michigan.

MR. PURDY: No.

MR. STEIN: New York.

MR. METZLER: No.

MR. STEIN: Ohio.

MR. EAGLE: No.

MR. STEIN: Pennsylvania.

MR. LYON: No.

MR. STEIN: And the Federal Government.

Mr. Poston.

MR. POSTON: I think Mr. Gamet gave the report. I might, for my edification, ask whether or not we are up

to schedule with regards to phosphate removal.

MR. STEIN: Well, I think if you ask that question, Mr. Poston, you have got two problems: One, what is the schedule? And, by the way, I am not being at all facetious about this, because we did put out a schedule of 1970 for completion of secondary treatment and disinfection; 1971 for phosphates. That, I think, was done by the Federal people in good faith on the basis of the summary.

According to several of the Conference participants, when we arrived at that, they genuinely did not believe that we arrived at that 1971 date for the completion of the phosphate removal.

Now, in going over this record, and checking everyone's notes, there were differing opinions on this, and one of the things that we are going to do here is try to get a firm schedule for phosphate removal that hopefully all of the Conferees could agree on. This is one of the major purposes of this Conference. So when you ask about are we on schedule on phosphorus removal, the first question I have to ask is what the schedule is.

MR. POSTON: Well, Mr. Chairman, I was referring back to the date -- the Conference dated October 4, in 1968, and it was Recommendation 1 that each State -- now, wait a minute. The terminal date for construction of

facilities to effect such phosphate removal shall be 1971.

MR. STEIN: That is the statement, because I just said that it is in dispute and that is one of the major reasons for having this meeting here today, precisely that statement that you read. It is not the recollection of any of the Conferees that the Conferees agreed on that at that Conference.

This is one of the things we have to bear in mind, and I hope we can work that out this afternoon.

MR. LYON: Well, it might be helpful, Mr. Chairman, to go back to that meeting, and the discussion on Page 133 and 134, which does imply at least -- you have to admit that it wasn't nailed down absolutely, but it sure has a lot of language in there about 1971.

MR. STEIN: That is right.

Now, here is my point here: We read that, and obviously when this issue came up we went over the transcript with a fine tooth comb. As a matter of fact, that date wouldn't have been in there unless the people in Washington did not think this applied in the transcript.

Now, if you read the transcript -- and we are getting into a very technical legal discussion here but you have to bear with us -- if you read the transcript, what you will find in the transcript is an indication

that the 1971 date might have been the date intended. However, as you look at this transcript, very frequently in this transcript -- and we had this once today -- we went off the record. What went on off the record is not recorded in the transcript.

At least three of the Conferees had a different notion of what happened and what appears in the transcript. With the state of the record in that condition, the determination was made -- and I think I corresponded with Mr. Metzler, Mr. Poole, I believe, Mr. Purdy, on this matter -- we said in view of this, no one is having a shell game here or putting something through real fast. If there is a genuine difference, we thought the time to resolve that would be when we next would all get together. And now is the time and we are going to get to the date. And I think rather than go over the past record where we know there are different interpretations, we start out and go on from here, because I don't think we are going to resolve what the record said, since there are many different opinions.

Well, Mr. Poston --

MR. POSTON: Pardon?

MR. STEIN: Now, did you want to wait until we get to the discussion on these phosphates, then, to take that up?

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MR. POSTON: I will wait if you wish.

MR. STEIN: But I think this is one of the key things we are here for.

Now, how about the report on the program to protect Lake Erie from agricultural and urban runoff? Do we have that?

MR. POSTON: Yes, sir.

I think Mr. Jesse Hicks of the Soil Conservation, U.S. Department of Agriculture Soil Conservation Service, is here today, and he has a statement to make. This is to be followed by Mr. Lloyd Harrold of the Agricultural Research Service.

STATEMENT OF JESSE L. HICKS, ASSISTANT
STATE CONSERVATIONIST, UNITED STATES
DEPARTMENT OF AGRICULTURE, SOIL
CONSERVATION SERVICE, COLUMBUS, OHIO

MR. HICKS: Mr. Chairman, Conferees, and ladies and gentlemen, I am Jesse L. Hicks, Assistant State Conservationist for the U.S. Soil Conservation Service, Department of Agriculture, stationed here in Ohio, and I have a brief statement, and I can furnish this for the proceedings.

Sediment, the product of erosion, is a major

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pollutant of our streams, lakes, and rivers. It is defined as solid matter, organic or mineral, that is being moved from its site of origin by water, air, ice or gravity.

Of the many water pollutants, sediment is the most common and occurs nationwide. From the standpoint of volume, it greatly exceeds the combined total of all other substances that pollute the surface waters of our nation.

Sources of sediment are sheet erosion by water; gullying by concentrated runoff; streambank erosion; flood erosion by scouring in low areas; erosion from urban, industrial, and other construction sites; roadside erosion from cuts and fills; runoff from surface mining areas; and pollutants from wastes of cities and industries.

Because of the large area involved, agricultural lands supply the greatest amount of sediment to the total load carried by streams. Land in row crops produces the most soil loss. This amount is dependent to a large extent on the crops, tillage practices, slope, and climate.

The Maumee Basin, a major agricultural area in northwest Ohio is estimated to have a sediment yield of two million tons per year. While agricultural lands

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produce much sediment, urban areas under construction produces a much larger proportionate share of the sediment load. It has been found that the average storm yield from a construction site is:

10 times greater than from cultivated land

200 times greater than from grass areas

2000 times greater than from forest lands

Many such areas lie in close proximity to major streams and bodies of water, so the massive amounts of sediment are introduced directly into the water. Much of the tilled agricultural lands such as we have here in northeast Ohio are scattered and, therefore, much sediment is filtered out before it reaches major water sources. Conservation practices on cultivated areas can reduce sediment yields by as much as 80 to 90 percent according to studies.

In recent years, urban developments have vastly increased the evidence of land erosion and created untold damage. In many of these developments, soil conservation is ignored and the result is disastrous. One such urban area in Maryland, of the many thousands in the country, produced 25,000 tons of sediment per square mile annually, many times the amount produced by nearby farmland. Similar cases are occurring in the Lake Erie drainage area where

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construction leaves soil material unprotected.

Erosion damage and silt production along roadsides is likewise a large contributor to the total sediment problem. Roadside erosion defaces landscapes and makes roads dangerous to travel. It results in excessive highway maintenance cost. As much as 350 tons of soil per acre may be lost in a single year. This is many times the maximum loss from a cultivated field.

Another large source of pollution in the United States is the 3.2 million acres of land disturbed by surface mining. Of this figure, over two million acres need conservation treatment. Forty percent has eroded enough to form rills and gullies, causing a heavy silt load that may drain into streams and lakes, and destroy fish and natural beauty. In many areas, surface mining is the major source of water pollution. Disturbing the land surface for mining also destroys wildlife habitat. Nearly two million acres have been destroyed by surface mining alone.

Much of the sediment in many streams comes from erosion of the streambank itself. Because stream and river banks are part of the water and sediment conveyance system, soil eroded from these lands is immediately converted to damaging sediment. This is also true of erosion on many lake shores which dump thousands of tons

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of soil directly into the lakes annually.

Storage capacity of artificial reservoirs and natural lakes is depleted by deposition of sediment. This not only affects water supply and hydroelectric power, but flood control as well. Sediment obstructs storm sewers and road ditches. It impedes navigation in harbors and waterways and makes treatment more expensive for municipal and industrial water. It causes excessive wear on pumping equipment and irrigation systems. It causes damage to aquatic life and loss of recreational opportunities. In some situations, sediment in water has clogged underground aquifers. This is extremely important when there is a need to recharge depleted water sources.

Most of the other pollution resulting from agricultural activities enters flowing streams through runoff from the land. Many of the polluting materials, such as phosphorus and others are carried along attached to sediment particles resulting from erosion of farmland. Measures that control runoff and reduce erosion, therefore, will help to reduce the volume of other pollutants.

The list of the adverse effects of sediment on our environment and costs to our economy is long. But, perhaps the greatest cost of all is the loss from its

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original location of valuable topsoil that makes up a large part of the sediment burden.

In the past, the control of erosion upstream on farms has received the most attention. But if conservation measures were applied everywhere, not just on farms, much of the sediment pollution could be eliminated. It is the unwise land use on all the acres of both urban and rural land that fills reservoirs with sediment, floods basements, cracks foundations, pollutes water, damages roads costing millions of dollars, and damages wildlife and recreation areas indefinitely. With the further concentration of industry and people in the watersheds, the problems of sediment pollution will be intensified unless all segments of society lend their support to effective sediment control programs on all land uses.

Individual citizens control most of the countryside, landscape, and natural resources. Here on privately owned land is where the biggest and most difficult job of resource management is being performed, and where, by necessity, it will have to be performed in the future.

The problem of controlling critical sediment sources on nonagricultural land exceeds that of

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agricultural land because few people are aware of the serious problem or are willing to do anything about it.

Road builders, developers, other builders, and land users can reduce erosion and subsequent deposition by (1) exposing the smallest amount of bare land for the shortest period of time; (2) using temporary ground cover and planting permanent sod quickly; (3) using diversions, sediment basins, and terraces to trap sediment; (4) saving and using natural vegetation whenever possible; and (5) following natural topography and land drainage patterns when laying out large developments.

Controlling erosion and sediment has long been an objective of the U.S. Department of Agriculture through its technical assistance, cost-sharing, research and credit programs. Through the years, we have gained the technical know-how and ability to deal with these problems but are limited by legislation, authorities, and resources. Local soil and water conservation districts are organized in all of the Lake Erie Drainage Area, and have going programs for erosion control and sediment reduction.

Rates of erosion can be reduced significantly on both agricultural and urban areas through low cost erosion control measures. By reducing erosion, these control

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measures would reduce sediment pollution in our streams and reservoirs by a corresponding amount.

How can pollution from sediment be reduced in Lake Erie? Several actions are essential:

(1) Technical and financial assistance in installing special measures for pollution control should be expanded. Long-term credit and cost-sharing should be included in current programs of the USDA to be used for this proposal.

(2) Local units of government and other public bodies need further assistance for effective erosion and sediment control programs in urban and industrial developments.

(3) Authorities and institutional arrangements are needed to control erosion along roads and highways, streambanks, and strip mined areas.

(4) Greater attention should be given to pollution control in watershed and river basin planning. Pollution is a watershed problem and its solution requires action on a watershed or river basin basis. Control of high-sediment-source areas, additional emphasis on land treatment practices, and storage for water-quality management should be given greater consideration.

Additional funds are needed to adequately

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finance the upstream watershed program, both for planning and construction. For example, in the Maumee Basin, which is a large contributor of sediment to Lake Erie, as previously mentioned, there are 26 applications for assistance under the Watershed Protection and Flood Prevention Act (Public Law 566). Three of these watersheds have been planned, approved by Congress, and construction is now underway. Eight watersheds are in various stages of planning. There is a backlog of 15 applications waiting to be planned, and under the current level of funding it will be several years before construction and land treatment work can be started. The land treatment portion is one of the most important elements of a watershed plan and is the key to sediment reduction.

(5) We need to accelerate research. Additional practical methods to control the various types of pollution from agricultural lands should be developed. The ARS and FS in the USDA are presently doing research in sediment control and pollution abatement.

We have a technical staff available to help plan and apply those measures already known to be effective in erosion and sediment control. Minor amendments to existing legislation would probably be necessary to provide adequate financial assistance to carry out these measures.

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We know that our natural environment is deteriorating. We believe that the agricultural agencies are in the position to work alongside other Federal, State, and local organizations to help improve the water quality in Lake Erie.

MR. STEIN: Thank you.

Are there any comments or questions?

MR. METZLER: Yes, I would like to ask some questions, and I will try to keep them short and hope you can keep the answers brief.

But I am interested in developing a little more point of view here for my own understanding. We understand what the problem is and you described it very well. The last couple of minutes I thought you were almost getting to the solution.

First, what area do you work in? Are you familiar with Ohio only?

MR. HICKS: I am familiar with the areas we work in, in the Department of Agriculture, all over briefly. I cover the State of Ohio here, but I have worked in other States.

MR. METZLER: Can you give me some idea in the State of Ohio, or in the Basin that we are talking about, what percentage of the land is covered by organized soil conservation districts?

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MR. HICKS: One hundred percent.

MR. METZLER: What kind of compliance do you have? What percentage of compliance would you have on the average?

MR. HICKS: With the district programs?

MR. METZLER: Yes.

MR. HICKS: I would say probably around 50 to 60 percent. I wouldn't want to be quoted on that, but pretty high. I could get that figure for you.

MR. METZLER: Well, I was thinking that before you could go into a watershed development program, you require 65 percent, don't you?

MR. HICKS: I think we are talking about two different things.

MR. METZLER: All right. I asked first about soil conservation.

MR. HICKS: Soil conservation districts -- we cover the whole area, and we furnish technical assistance to these local districts in carrying out soil and water conservation programs. This is not mandatory; all we have is our power of persuasion.

MR. METZLER: That is correct.

Now, how about watershed districts?

MR. HICKS: Watershed districts are made on an application basis.

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MR. METZLER: Yes.

MR. HICKS: And they have to be on areas of 250,000 acres or less. When we receive an application -- or maybe I should say it this way: The application is submitted to the Ohio Department of Natural Resources, or to the State agency, depending on the State. If it is approved by the State agency, it is then turned over to the Soil Conservation Service for assistance in planning, and subsequent construction.

MR. METZLER: And my question was: Can you give me some idea of the percentage of the area in Lake Erie Drainage, for example, that is covered by watershed districts?

MR. HICKS: I am sorry. I could get that figure for you. In the Maumee Basin it is I would say probably 60 to 70 percent covered now with applications. This is where we have the 26 applications on hand.

MR. METZLER: You would think that was maybe one of the more advanced ones though.

MR. HICKS: Yes.

MR. METZLER: What kind of appropriations do you have at Ashley for planning, first, and construction, second, in watershed work?

MR. HICKS: Well, traditionally we have been getting about \$6 million nationwide for total watershed

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planning.

MR. METZLER: For planning.

MR. HICKS: Which means that here in Ohio we get around \$120,000 or \$30,000 a year.

MR. METZLER: Does the State put any money in?

MR. HICKS: No, not as of now.

MR. METZLER: And your constuction budget nationally is running around ten times that figure?

MR. HICKS: Roughly.

MR. METZLER: Mr. Chairman, I appreciate your permitting me to develop this line of questioning.

The point that ought to be made here is that even though we are putting small investment in other parts of water pollution abatement, that the effort that is going into this particular activity of holding the soil on the land where it belongs is perhaps -- is extremely small.

The construction budget for the Corps of Engineers and the Bureau of Reclamation runs about \$2 billion a year for the country. We are talking about \$60 million a year for the country here in this kind of a program. I just quote these two figures to give you some feeling for the fact that, again, in this area, there needs to be a lot more support both from the Department of Agriculture and the Department of Interior for adequate funding of these programs that hold the soil on

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the land and prevent erosion.

MR. STEIN: I think that is very true, but, again, let me say this to all here, particularly to our friends in the Department of Agriculture: I have heard these reports again and again. I think most of us here are familiar with the program. I think we can do a lot better by it. We can zero in if we want to get help for a "Save Lake Erie," or a pollution control program, if we can deal with specifics on what program is going to keep out what material from the lake, whether it is silt, whether it is pesticides, or any other deleterious material; where these are going to be and what they are going to keep out.

Now, with all of the admitted imperfections of the State and Federal programs or the municipal programs that you have heard, what we attempted to do is go down industry by industry, city by city, Federal installation by Federal installation, see where we were and what had to be done.

Try as we might -- and I am not saying this as a criticism here in Ohio, because this is general -- try as we might, we couldn't do this in Lake Michigan either. We had the same kind of problem. The people came up and asked about a problem of controlling the silt going into Lake Michigan or probably agricultural chemicals

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going into Lake Michigan.

Again, this was vague. No one had any notion specifically except in the most general terms where these were applied, how much was applied, how much, if any, was getting in, and I think the way we can really help, if we are going to help with this, and if we are going to really get at this problem of pollution from runoff, is to really try to get down to the nitty-gritty of the specifics, by those horrible tables, if you will, going basin by basin; what is running off from where; what kind of material is coming out; and if we do certain programs what we are going to stop. Then I think we have something to sell. But until we come up with that, I do believe we are going to have some very real problems.

I am going to be very frank and say that I have been disappointed in not being able to get anything more tangible and more specific from the agricultural authorities that we have had here. And then, in general -- I don't want to specify the ones here, because the ones we are getting here are no different than the ones we are getting in other areas of the country.

Did you want to comment on that, or answer?

MR. HICKS: I think we could give you some specifics in terms of what is being done right now, if this is what you need.

We have reports in our Washington office

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county by county on the amounts of conservation practices that are being applied in every county every year, and this could be made available to you, I am sure.

I appreciate the other gentleman's comment there on the reduction of sediment. We think it is a tremendous problem. We can keep the soil on the land, so to speak, for a matter of a few cents a cubic yard, whereas if we have to let it run down into Lake Erie, it would be billed out more like a dollar or a dollar and a half per cubic yard.

MR. STEIN: Mr. Eagle, did you want to comment?

MR. EAGLE: Mr. Hicks, are you familiar with this Technical Committee's report of this Conference which gives some figures on phosphates in Lake Erie from various sources and where it says here that the land runoff in the Lake Erie Basin carries 20,000 pounds of phosphates per day? Do you know about this or --

MR. HICKS: I am not sure of that report. I don't believe I have seen it.

MR. EAGLE: You haven't seen it. You mean Mr. Poston didn't supply you with a copy of the report when he asked you to comment on it?

MR. HICKS: Who made that report?

MR. EAGLE: The Technical Committee of this Conference.

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MR. POSTON: I think we got this report this morning, Mr. Eagle.

MR. EAGLE: You got it about a year ago. Haven't you seen it?

MR. POSTON: I thought you were quoting from our other report.

MR. EAGLE: No. But these are figures that we are guided by in our waste treatment and unless you have some better figures or some reason to refute these, I think we ought to get squared away here as to who is contributing what pollution.

That is all of my comments.

MR. POSTON: How long will that be?

MR. HARROLD: I will cut it down 80 percent like you are cutting down phosphorus. (Laughter)

MR. STEIN: I hope you didn't have that quote on there. You said you are cutting it down 80 percent like you are cutting down phosphorus? If you are doing that well, it will take a long time.

STATEMENT OF LLOYD L. HARROLD, RESEARCH
LEADER, UNITED STATES DEPARTMENT OF
AGRICULTURE, SOIL AND WATER CONSERVATION
RESEARCH, COSHOCTON, OHIO

MR. HARROLD: I am Lloyd Harrold, officer

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in charge of the Soil and Water Conservation Research Station, United States Department of Agriculture, Coshocton, Ohio.

The United States is quite proud and we are all proud of the quality and quantity of our agricultural production and yet we are receiving numerous questions about how did we get there; what are the signs along the way of this agricultural prosperity, signs of gullies, signs of lakes filled with sediment, pollution; rivers clogged with soil -- these are all signs that something has happened.

We, in this country, have gone like mad and have created havoc, and we are concerned.

Indeed, agriculture itself, through its research agencies, is critically examining the use of chemicals and their pollutional effects on and beyond the food production farm. The Soil and Water Conservation Research Division of the Agricultural Research Service, in cooperation with the Ohio Agricultural Research and Development Center has started a cooperative research program near Coshocton, Ohio. That is about three years ago. They started it there because we have some 25 years of hydrologic observations upon which to base our analysis of our pollutional effects that we have studied during the

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three years so far.

This research program is to continue if we are going to get averages and quantify the pollution coming from agricultural use of chemicals.

On one area farm chemicals were applied at very high rates. We set up a program of sampling relating the samplings perhaps to water flow rates, total water flow for each storm, and our objective is to quantify the amounts of nitrates, phosphorus coming from the watershed, as well as dieldrin. We must use current and historic records of land treatment and water flow regimes to quantify and interpret the data. Individual samples are not enough.

Research has shown over numerous years that phosphorus, a widely used plant nutrient and a major factor in reservoir and lake pollution by algal growth, is mostly absorbed on the surface of soil particles. It does not readily dissolve in water. It will not move from farm fields in water in sizable quantities unless erosion moves the soil. Then it deposits in river channels, reservoirs and lakes.

Erosion-control farming practices recommended and applied through Soil and Water Conservation Districts are effective in reducing this kind of pollution from

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farmland.

In 1968, the sod on one watershed at the Coshocton Research Station was plowed to about 15 percent land slope. It was worked down with numerous tillage operations, after applying farm chemicals -- nitrogen, phosphorus, potash and dieldrin -- on the land, and one storm runoff caused an inch and a half of runoff and erosion of nearly six tons per acre, a sizable amount of pollution.

Nitrogen and phosphate was transported from the field by the soil erosion process.

In the same vicinity across the hill and subject to the same storm rainfall, there was another corn watershed. However, on this one, contour tillage and fewer mechanical soil pulverizing operations were performed. Runoff was only one-fifth that on the conventional practice area, and there was no erosion. Therefore, we can say that there was no transport of large quantities of phosphorus from this watershed.

The results of research on movement of sediment-transported agricultural pollutants -- phosphorus and dieldrin -- into water bodies during a three-year study period, 1966-1968, cannot be considered to represent severe or even average rainstorm recurrence expectancy,

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because with the backlog of information that we have, our experience so far has been less than average.

Studies in recent years at the Coshocton Station have shown that conventional tillage farm practices of plowing, disking, harrowing, planting, and cultivating encourage soil erosion and transport of soil-attached pollutants into surface streams and lakes.

New and somewhat revolutionary-like soil cropping practices such as minimum or no-tillage, in which rough or mulch-protected soil surfaces reduce runoff and erosion to almost insignificant amounts are being tested. For six consecutive years on a nine percent slope there has only been a little bit of runoff. There has been no erosion on continuous corn — unheard of in conventional practices.

This success story owes much to the mulch surface which prevents raindrop splash erosion and soil-surface sealing. Although there have been, as yet, no really big rainfall events in the study period, the beneficial effect of mulch for erosion control is expected to be quite large even when they do occur. Mulches on the well drained soils of the Coshocton watersheds are proving to be desirable from the standpoint of farm economy and are likely to be adopted

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widely on areas of like characteristics. Although these practices are expected to reduce erosion, they may depress crop yields on slowly permeable soils of other areas, thus diminishing the likelihood of widespread acceptance in these areas. This problem will have to be solved if sizable reductions in soil-transported pollutants in such areas is to be accomplished.

In the lake bed area, the work by Dr. Schwab of the Ohio Agricultural Research and Development Center at Castalia, Ohio, near Sandusky, where they have small plots, they apply irrigation water. Some plots are surface-drained only; some plots are sub-surface-drained only, and in the area of surface drainage where they have applied three inches of irrigation water, the total sediment yield was 50 percent per acre, and it is a little hard to see where the amount of erosion from the lake bed soils under these conditions could reach a total of half a ton or a ton per acre per year.

He found that there was 34 pounds per acre of nitrates and all were in the surface runoff from this irrigation. There was 17 pounds of nitrates per acre in the drainage water, and the phosphorus was less than zero.

They were applying water from the ground

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which had more phosphorus in it than they were able to detect in the drainage water from the area. In other words, the soil was picking up phosphorus instead of adding to the amount going off of the land, and being in the area of no surface runoff, they could consider that there was no phosphorus added to the water system from the agricultural production.

Nitrate moves readily dissolved in water. An increase in nitrogen fertilizer from 6 to 18 pounds per acre applied in the corn-to-wheat year of a four-year rotation at Coshocton has not in six rotations -- 24 years -- resulted in increased nitrate movement downward to the ground water reservoir. In fact, less nitrate leached below the root zone in the improved area than in the unimproved area. The additional nitrogen produced greater crop yield; which used more water; which resulted in less percolation water and less total nitrate pollution of ground water.

When nitrogen fertilizer is applied at rates of 100 pounds per acre or greater, there is a strong possibility that more nitrate is carried in percolation to the ground water reservoir. Such situations are hot spots whether they be local or widespread. It is possible to apply more nitrate and water to crop land than can be

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used by the crop. Waste of investment in fertilizer and irrigation water as well as pollution of downstream surface and underground water supplies results. Research has developed a science of fertilizer and water management and is increasing knowledge in this field. Such knowledge must be used to the maximum for farm economy and to reduce the hazard of polluting water.

I was quite interested in hearing that the State of Ohio plans to do research work in runoff water quality from the lake bed soils. Indeed, this is many, many years too late, but there is no later time we should begin. We should begin now. This is very hopeful. I hope that we in agriculture research service can cooperate in the plans and in the analysis and in assisting working with the State of Ohio, in gathering these data and interpreting them.

Pollution of the environment is a real and present problem. Agriculture is involved both by being adversely affected by pollution and as a source of pollutants. Research is defining the involvement of agriculture in the pollution picture by determining the fate of chemicals applied on farm lands. It is also developing cropping systems and other means for stabilizing or constraining pollutants arriving from

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agricultural operations. Such research will be profitable for the farmer by assuring maximum effectiveness of essential investments for fertilizers and other agricultural chemicals. The research also will benefit the general public by enhancing the quality of land and water resources.

Mr. Chairman, that is my presentation.

MR. STEIN: Thank you.

Are there any comments or questions?

Thank you very much, sir.

We will move on, and I think the next report is a short one, a report on the surveillance of Lake Erie.

Mr. Poston.

MR. POSTON: Mr. Harlow is presenting this report.

STATEMENT OF GEORGE L. HARLOW, DIRECTOR,
LAKE ERIE BASIN OFFICE, FEDERAL WATER
POLLUTION CONTROL ADMINISTRATION,
CLEVELAND, OHIO

MR. HARLOW: My name is George Harlow. I am Director of the Lake Erie Basin Office, Federal Water Pollution Control Administration, Cleveland, Ohio.

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Conferees, Mr. Chairman, ladies and gentlemen.

I hope you will permit me to give my discussion here without putting my coat on.

I will summarize this statement, and I will provide copies to the --

MR. STEIN: How about passing them out to the Conferees now?

MR. HARLOW: Okay.

In our surveillance last year, especially for dissolved oxygen, we found one very interesting phenomena that somewhat surprised us. On August 6, testing the dissolved oxygen in the hypolimnion of Lake Erie, or the bottom waters, we found that the waters were pretty well saturated with oxygen. We expected the level to be lower than it was.

Two days later, we sampled two stations that we had sampled on August 6, and found that the dissolved oxygen had dropped in that period down to 1.8 milligrams per liter.

This, in essence, involved a depletion of 6.5 milligrams per liter in the hypolimnion from the tests that we made in 52 hours. Why we felt this was rather interesting is because we had suspected up until now that the dissolved oxygen gradually depleted beginning about

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June in the hypolimnion to a low level late in August, rather than as this date indicated going all of a sudden.

That, in essence, summarizes the dissolved oxygen studies that we took last year, and we are doing a much more extensive dissolved oxygen study this summer to try and better define that particular phenomenon.

That completes the statement on surveillance.

(The report presented by Mr. Harlow in its entirety follows.)

At the request of the Lake Erie Enforcement Conferees, a survey was made to determine algal and dissolved oxygen characteristics in the Central Basin of Lake Erie during summer temperature stratification. Between June and October 1968, 22 locations were occupied repetitively.

Summer thermal stratification in Central Lake Erie begins in June. A thermocline is well formed by the first of July, remaining at a relatively constant depth during July and August. In September, the thermocline depth increases until isothermal conditions are established by the first of October.

The average water depth above the thermocline during the survey period was 54 feet.

A biological analysis of the Central Basin

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waters in July and August indicated total algal populations in both the surface and bottom waters were larger in the northern portion of the basin. Smaller populations occurred in midlake. Bottom water temperatures were generally warmer in the northern portion of the basin.

In late June, surface and hypolimnion dissolved oxygen was at or near saturation. Green algae were prevalent with similar numbers near the surface and in the hypolimnion.

During July and the first six days in August, algal populations diminished to about one-half of the June populations in both the surface and bottom water. Green algae were the most prevalent. Surface and bottom water dissolved oxygen was still at or near saturation.

On August 6, hypolimnion dissolved oxygen averaged 8.4 milligrams per liter. Two days later, the average bottom water dissolved oxygen dropped to 1.9 milligrams per liter, or a loss of 6.5 milligrams per liter in 52 hours. During the same period, average algal numbers increased on the surface while decreasing in the bottom water. Throughout August, bottom water algae populations remained low while surface populations increased.

By the end of August, throughout the hypolimnion the dissolved oxygen averaged 0.5 milligrams per liter and

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values ranged from zero to 1.8 milligrams per liter. The average algal population in the bottom water was about one-third of the surface populations. The most prevalent algae were greens, with occasional taste-producing blue-green dominance noted in the northern portion of the basin at the end of August.

By the end of the first week in September, the bottom water dissolved oxygen had increased to above 5 milligrams per liter. During the same period, algal numbers had increased four to seven times in both the surface and bottom water. Blue-green algal "blooms" were noted in the northwest portion of the Central Basin during the last week in August and first week in September.

By the end of September, algae populations were similar to those found in June with greens again becoming prevalent. By the first of October, temperature stratification had disappeared with consequent replenishment of dissolved oxygen in bottom waters.

A program to further investigate oxygen depletion mechanics is now in progress. Continuous automatic monitoring both above and below the thermocline for temperature and dissolved oxygen is scheduled July through August at five locations. During the last week in May, in early July, mid-August during quiescent and storm

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conditions, and mid-September, pertinent physical, chemical, microbiological, and aquatic biological tests will be made at the five locations. During the same periods, manual monitoring for dissolved oxygen, temperature and turbidity profiles will be accomplished at an additional eight stations strategically located between the automatically monitored stations.

Pertinent tests will be made on sediments sampled at the five automatic stations in early July. Instruments to mechanically measure sediment resuspension have been devised and will be used during periods of instability along with photographic techniques. Divers will be employed to photograph the sediment water interface during quiescent and storm conditions. With such a program, it is hoped a more definitive answer to the mechanics of oxygen depletion in the central basin hypolimnion can be ascertained.

MR. STEIN: Are there any comments or questions on surveillance?

Yes, Mr. Poston.

MR. POSTON: Mr. Harlow, you heard some discussion here about evaluation and deadlines, and in your studies in this Lake Erie Basin could you make a summary of progress with regards to dates as set forth in 1970?

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MR. HARLOW: Every six months, we collect from each State in the Lake Erie Basin how far we are along on meeting the schedules that were established at the March 22, 1967, Conference in Buffalo. Based on those original dates, our data shows that as of last January 1, that 75 percent of the cities have fallen behind and 47 percent of the industries.

MR. POSTON: This applies to their schedules for development of plans --

MR. HARLOW: This applies either to completion of final construction and pressing that button or to intermediate schedules that have gone by and without action having been taken by the local community or industry in regard to that interim schedule.

MR. POSTON: I noted a table back here --

MR. HARLOW: And it is summarized on that table back there, and unfortunately it does not have the Federal installations on there, and I think that is a good suggestion.

MR. LYON: This does not include any phosphate schedule, does it?

MR. HARLOW: No, this is just for the original schedules that we established in Buffalo on March 22, 1967, in regards to secondary treatment and an equivalent degree of treatment by industry.

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MR. LYON: But the thing that is a big issue, of course, and affects the whole pollution is the phosphate question. It shouldn't be misinterpreted to include that.

MR. HARLOW: It does not include that particular thing because, like we said earlier, there is some question there as to what is the schedule.

MR. POOLE: It must go beyond secondary treatment because all of the independent municipalities have secondary treatment. I think where we are behind schedule is on chlorination.

MR. HARLOW: I think you are right there, Mr. Poole.

MR. STEIN: That is right.

On the old schedule -- and, again, you have to put this into perspective -- I think there are several things here, and no one wants to keep up with a schedule as much as I do, because that is our business, but when we work with a schedule we have to be precise and that is exactly where we have to be precise.

Now, there are several things you have to determine: One, where a schedule is not met because secondary treatment isn't being provided and obviously the plant isn't completed yet, if that is the case, to handle all of the sewerage; and the other thing if chlorination

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isn't being provided. These are often due to equipment delays, and I think the development or putting in of chlorination or a chlorination device, while very important, is not precisely in the category of a missed date of not having the plant operating at all on secondary treatment.

The other kinds of dates we have to determine are 1) whether the slippage is on a completion date or will make the completion date impossible of compliance, or 2) whether this missed date is an interim date.

Now, sometimes municipalities or an industry will miss an interim date, but yet be able to catch up in a later period and still come under the wire in the operation date. As long as we are dealing with schedules we have to work with refinement, so to speak, with a scalpel, and be sure precisely what we are dealing with in each case.

Again, let me just give you this analogy -- and Mr. Poole is a hunter. We are not at the beginning where we talk in general terms about phosphate removal for all. That was fine. But when you are trying to get compliance and you are talking in general terms, it is like going down and shooting at that flock of geese. If you shoot at that flock and just at that flock, you are bound to miss because you would be surprised what the spaces are

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between each goose. What you have to do is take a lead on a particular one and go for that one or you are not going to bring any down.

In compliance, I think that is the trick. The reason I keep going over these lists, over and over case by case is that is the only way to get this done to make the list smaller and smaller. I am not sure with these percentage points if it is a notion of whether it is going to be helpful in getting that list smaller.

Again, let me try to summarize this in another way. We have a list of people we think are contributing wastes. We have a schedule. We have one list where we believe people are in compliance, another where they are not quite making it. The name of the game is to get the first list as big as possible and the second list as small as we can get it. The only way you can do that is zero in on specific cases one at a time, as boring and painful as it might be.

Are there any other comments or questions on this?

MR. PURDY: I don't have a question of Mr. Harlow, but I am somewhat confused by the line of questioning, and following along on Mr. Metzler's earlier question as to whether or not the State reports were adequate and dealt with this question or the evaluation

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of where we are on the present schedule.

With respect to Michigan's report this morning, Mr. Frost went over page four of our report, and I think it is laid out rather clearly on the 25 industrial plants and the 12 municipal units that have signed stipulations and were included in the original approved time schedule of the Conferees earlier. It specifically lays out a table here of those that are on the original schedule and are in compliance; the number that are on a modified schedule; those that are not in compliance, and action pending; and those that are not in compliance and legal action being taken.

Now, later on in the appendices of the report, there are some 17 pages that give the details on all of the municipalities and industries in the basin.

Now, if the Conferees wish to take the time, we are prepared to go over those one by one, but to save time we did summarize in the table, and I think it has been presented.

MR. STEIN: That is right.

I have no problem with that.

Does anyone have one?

MR. POSTON: I still have a question in my mind regarding Detroit as to whether or not they are going to have secondary treatment by 1971, if that is the date that

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they are going to extend to, and what degree that will be. Will it be 80 percent removal or --

MR. PURDY: The stipulation requirements require an 80 percent minimum total phosphorus removal, and also a pound figure, and Detroit stated this morning that they will meet that percent removal figure, and they will meet that pound figure by 1972.

MR. POSTON: BOD as well as phosphate?

MR. PURDY: The pound figure, and 80 percent removal on phosphates, suspended solids, phenol, coliform.

MR. STEIN: All of the words.

As I understood Mr. Remus this morning, he said he would make these, and I know originally we had the stipulations. But the extension of time he said over the original time was what?

MR. PURDY: Twelve to eighteen months.

MR. STEIN: Now, the issue that the conferees had particularly with a big city like Detroit where they are taking in the suburbs, in view of the problems that they have had in Detroit, and the outline of the work that Mr. Remus and his people have done, we have two questions. One is under the circumstances are they making a bona fide effort to comply? The second is, given the results, the circumstances, and all of the factors we have, with what is indicated might be a twelve to eighteen month

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delay, do the Conferees consider that to be in substantial compliance with the recommendations of the Conference in light of developing circumstances. or do they consider it such a stage of noncompliance that you believe you can get faster pollution action by taking another legal step?

If our objective is to get Lake Erie clean as fast as we can, I think this is the question we have to keep in mind: Considering what any particular industry or municipality has done, will we get any real faster action if you go to the next legal step? Or should we consider what they have done up to now for substantial compliance?

MR. POSTON: Mr. Chairman, I don't know that further legal action is the only way you can get this stepped up. I think, in the past -- I know Mr. Poole has shortened these time schedules in places by conversations and prodding of particular industries or the municipality concerned. This was the exploration that I was interested in.

MR. STEIN: I think we have a semantics difficulty. I know what Mr. Poole has done, and we have done the same thing in many cases. If you call those friendly conversations to cut down the date not further legal action, I guess that is your privilege.

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MR. LYON: Mr. Chairman, I think that the question you are raising is a very relevant one. In my mind, it narrows down to the simple question: How many extensions of time are you going to give any individual case? How often? And it seems to me that, at some point, it would seem appropriate for the Conferees -- perhaps not today, but some day soon -- to agree on that particular question: How many extensions of time should any case be given? Once we have agreed on that, we are in business.

Then, the next question is: Should legal action be taken?

MR. STEIN: This is one of the key points we are going to have to consider in the discussion. So, unless you have something more to say, I suggest we go on with the Conference.

As a matter of fact, because this was a Conference, I let this line of question develop with Mr. Harlow because, as we say in the trade, your cross examination question was beyond the scope of the direct. He didn't testify to that when he came up, but we let it go anyway.

Let us get on to what are two key points. Then we can get on with our discussion and see if we can get an agreement.

G. H. Eagle

One, the committee report on the model for Lake Erie.

Mr. Eagle, do you want to report on that?

MR. EAGLE: Mr. Chairman, Conferees, ladies and gentlemen.

Mr. Chairman, a tremendous lot of work has gone into this report and recommendations. At this late hour, you know, I hesitate to get into the details of this, but I don't know how we can adequately discuss it if we don't get into some detail.

I wonder if this shouldn't be deferred to a future time. I have sent out copies of this to the Conferees in advance of this meeting. I don't know whether any of them have had an opportunity to study from them or not.

MR. STEIN: I hear from the Conferees that they have read it.

MR. EAGLE: And I think that this is very comprehensive and it is going to take some time if we do it adequately, and I certainly don't want to do it inadequately.

MR. STEIN: I think the Conferees have read it. And here is my point on this because I have read it, too, and I am not going to get into any of the substance, but

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I am going to tell you what the problem is as I see it: Originally, when Mr. Lyon proposed the model, he said we could do a model for maybe \$200,000, or something like that, as I recall the figure.

The difficulty that I find with this -- I find nothing wrong with your proposal -- is the figure has kind of escalated.

Now, the question is where we are going to get the money. If we are talking, instead of \$200,000, from a quarter of a million to a million dollars for the model, and a budget of \$100,000 a year, which may not be so bad for four years, I think we have to take a hard look at what we are going to do and the resources available.

The reason we entertain this is: knowing the kind of ballpark figure and the money that at least I as the enforcement man could put my hands on, I might be ready to talk to you when you talk in terms of a project for \$200,000; but when you get up to \$1 million, this is something that Assistant Commissioners who come from Washington cannot get too easily. If we can relate the scope of the project to the money and at least get that, I have some direction in which to go because, obviously, the thing that is either going to move the model or not move the model is the financing.

Or don't you agree?

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MR. EAGLE: Well, this is the committee's report; it isn't my report particularly. I was a member of the committee only.

MR. STEIN: Right.

MR. EAGLE: And Mr. Lyon had a representative on the committee and he participated in the report, and I might remark that there are all kinds of models, you know. Some of them are very nice and some of them aren't so nice. So it depends on what kind of a model we are talking about.

MR. STEIN: Well, that is right. You know, I was going to say that before when I got that dry report of how well they were doing in Erie, Pennsylvania. When they weren't doing so well Lyon produced a model. I am not sure we didn't do better when they weren't doing so well. (Laughter)

MR. EAGLE: Is that the type he was talking about?

MR. LYON: If I may comment on the report, Mr. Chairman, I think the Model Committee, even in the scientific sense, did a very good job in pulling together some of the broad objectives that need to be followed over the long term in relation to the development of a model.

We have to develop a model sooner or later because we owe it to the people who are going to spend the money to somehow relate their efforts in terms of

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money and treatment plants to the improvement of the quality of the lake.

One reason, I suspect, why the price tag went up is because the Model Committee did go, quite frankly, beyond the original assignment which related, if I recall correctly, to the question of eutrophication, nutrient problems, as the original resolution indicated.

I would believe that if one were to concentrate on the nutrient problem initially that the cost is likely to come down significantly..

There is another point that we did make in the context of our membership of the committee that is not included in the report, and that is that it is our opinion that a governmental agency should be the agency which does carry out this project.

There are a number of reasons for this, and in this particular case it is particularly important because we are dealing with international waters, and the only way we are going to clean up Lake Erie is to make it an international project. There is pollution on both sides of the lake, and the organization that is designed to do that by treaty between the United States and Canada is the IJC.

Now, there is another benefit to working through the IJC, International Joint Commission, and that is that

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the Canadians themselves have done a great deal of work on models; they have an awful lot of data that will be useful, so that their brainpower and our brainpower together can make this a much more feasible and perhaps less costly task.

In addition to the fact that it just simply doesn't make any sense to do a model of half the lake, it has got to be a model of the whole lake, and if we are going to do that, we will have to work through the IJC. So, basically, there are two important points I want to make: Let's stick with the nutrient aspect of the problem initially and expend to the others later, and this will help keep the cost down; and, secondly: let us have the IJC be the organization that does the model. In that way we will have the full participation of the Province, particularly, of Ontario, the Dominion of Canada, the Federal Water Pollution Control Administration, and the States, and I think you well know that the present IJC report that is being developed is attaining this same kind of hand where the scientists on both sides of the international boundary are putting their best shoulders to this effort.

MR. EAGLE: Mr. Lyon, could you tell me where we went beyond the nutrient problem or departed from it?

MR. LYON: Well, again, George, I don't mean to

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be -- I think you went beyond it, and I think this is fine. I think ultimately --

MR. EAGLE: Well, be specific.

MR. LYON: Sub project (2), Chemical Quality.

MR. EAGLE: You don't know that doesn't have anything to do with the algal problem. How do you know that doesn't have anything to do with it until you make an investigation and determine that it doesn't have anything to do with the algal problem in Lake Erie?

MR. LYON: Some aspects of chemical quality, of course, have something to do with it.

MR. EAGLE: That is why it is in there.

MR. LYON: There is things like BOD and DO in there, and this will no doubt raise the cost. I think we should delay on the oxygen cycle part of the problem and do the crucial one first which is the nutrient one. BOD and DO do not have any direct causal relationship with the nutrient problem.

The algae response we have got to do. No question about that.

The effect of the waste loads, we should do only as they relate to the nutrient problem.

And then you get Sub project (4), causal relations between DO in the Central Basin and thermocline. I don't know. I suspect that this is not too closely

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related to the phosphate problem.

The point is to try to emphasize the nutrient eutrophication problem initially so that we can get that one out of the works, because that is the big unanswered question.

We have a pretty good feel for the fact that BOD and DO problems tend to be local problems. In other words, near Erie, near Detroit, near Cleveland, we get low DO because of the BOD discharges. So this we understand a lot better than we understand the nutrient problem.

MR. EAGLE: Well, Mr. Lyon, I would just say in rebuttal, and I am certainly no expert in this area, but we did have experts in from all over -- from the Federal agencies, from other State agencies, from private agencies, and so on -- and almost unanimously, they agreed that all of these things were necessary to make a proper evaluation of the problems in Lake Erie so far as eutrophication is concerned.

MR. LYON: I can't help but agree with the fact that in order to do a complete job you have to do all these things ultimately..

MR. EAGLE: You can take it one, two, three, but I think there ought to be a complete plan in mind to come out of this eventually.

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MR. LYON: I agree with you.

MR. EAGLE: That is why we broke this down in parts.

MR. LYON: All I am saying is --

MR. EAGLE: Take it in steps, one, two, three, four, five.

MR. STEIN: Let me try to get some steps.

MR. EAGLE: Yes.

MR. STEIN: George, I would like to get started on this. As I read the figures, is it possible -- you have said that what we have to do now is come up with -- on Page 8 -- and I am assuming that we have all at least read part of this -- that funding to the extent of our \$400,000 be made available at once to retain a central coordinating administrative agency. Does that relate to the four years cost?

MR. EAGLE: That is just for the coordinating agency. Now, for one year.

MR. STEIN: For one year.

MR. EAGLE: \$400,000 -- \$100,000 per year.

MR. STEIN: Okay, now, let me try to just put -- you know we have to finance this on a one-year basis, that is our fiscal year.

MR. EAGLE: A hundred thousand dollars a year.

MR. STEIN: Would this be reasonable, if in

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one year we are going to embark on this, to say -- I am just trying to get this off the ground -- that the kind of money we have to look for is \$100,000? Can we get started with that?

MR. EAGLE: I don't know, Mr. Stein, whether this would be practical or not because this agency -- whoever it might be -- has got to go out and hire some very talented expert personnel, and whether you can hire them for one year or not, I don't know. I would doubt it.

MR. STEIN: Well, we will get to the kind of people. The point is we are not asking any people to do any more than we are asking you or me to do, George, or anyone sitting at the table.

In other words, Congress hasn't appropriated money for my next year's salary. I am not sure they have appropriated it for this one, but they surely haven't appropriated for next year. I think anyone who works on a governmental project lives by year to year.

MR. EAGLE: Some kind of a -- you know, a three-year project, funded one year at a time.

MR. STEIN: But, you see, we run into -- George, what I am trying to do is get a realistic figure of money we can get.

We run into two problems in the Government, and you have all been familiar with it: Obviously, we can just

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get money on a fiscal-year-by-fiscal-year basis. When we tie people down in a specific agreement to more than one fiscal year, they would say we are holding a gun to their heads for the next year.

But I am also suggesting, if we can, with a year's money -- let's assume they buy the rest of this -- we are talking in terms of \$100,000. I think we are in the realm of what I conceive of possibility of putting a financial structure together. Once you get up to these other figures for the next years then I think we have to adopt a different approach.

What I am saying, Mr. Eagle -- I am not saying we shouldn't do this -- but I think by that time, unless we are going to get a lot more money from the State than I suspect is available and go for the \$400,000 --

MR. EAGLE: Mr. Stein, aren't you familiar with the amendment to the 1969 Water Quality Improvement Act which carries a \$20 million authorization for studies, pollution studies in the Great Lakes? And my information is that this has a very good chance of passing.

Now, how much money would be appropriated I have no idea, but this would be an authorization. And granted that we may not be able to get anywhere near what I have outlined here as a total figure, but I think that we should make a very concerted effort to try to get a

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substantial amount of money.

MR. STEIN: Mr. Eagle, I am not arguing with what you are saying. What I am saying, if you wanted to depend on that --

MR. EAGLE: This is up to the Conferees.

MR. STEIN: If you are going to depend on an authorization and appropriation, then, again, this is a judgment for the Conferees to make. Obviously, the kind of funding to get started would really be beyond the resources of what we can do as Conferees or even going back home with it.

However, if we are talking in terms of \$100,000, then I think we as Conferees may have a job to do in our own operations to try to get the money together and get started.

Now, the question here is: If you are going to get started, do you want to start on a \$100,000 basis, or do you want to wait until there might be --

MR. EAGLE: I think you are way ahead of us, Mr. Stein. I haven't heard from the other Conferees -- only Mr. Lyon -- whether the others feel that this is a worthwhile undertaking or not. I think this is the number one thing to decide, whether it is a worthwhile undertaking.

MR. STEIN: All right.

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MR. PURDY: Mr. Stein, I am concerned about how many dollars we are going to be spending for studies -- model studies of the same nature.

For example, the Great Lakes Basin Commission has programmed, I think, something in the neighborhood of \$1 million for their 1970 budget. It would seem to me that it would be a waste of money if the Great Lakes Basin Commission would go off and do modeling studies, on one hand, and this group of Conferees would put additional moneys in a separate study. I think we ought to save some of those scarce dollars for construction.

MR. STEIN: Are there any other comments on that?

MR. METZLER: Mr. Chairman.

MR. STEIN: Yes.

MR. METZLER: I would like to support two things: First, I would like to support doing this cooperatively with the Canadians, because I don't see how you can really get a meaningful study otherwise; second, because, in this case, I have a feeling our partners know more about this than we do, if they were to become our partners. So I think it ought to be done through that kind of mechanism.

This is the first time I have seen the \$400,000 figure. The figure that I have heard about is \$100,000. And I have a feeling, just in a quick look at this report,

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that we have talked about putting in a lot of data collection type of thing, actually getting more field data, and so forth. It is my understanding, George, that the experts -- and my representative on the committee feels -- that for \$100,000 it was possible to put together, using the existing data and get a mathematical model on phosphates; and that is what I have supported, and that is what I would like to continue to support.

MR. EAGLE: I am sorry, Dr. Hetling didn't express that in the committee meeting. We got these figures from prospective contractors of how much it would take to put this together step by step, and these figures are in the appendix here from the prospective contractors of how much it would take to do this. A hundred thousand dollars is for the administrative agency, whatever it might be.

MR. LYON: Well, Mr. Chairman, if I may I would like to make a specific suggestion. Mr. Purdy has already pointed out that there is more than one cook on this particular broth, and so has Mr. Metzler.

The committee has put together a wealth of very relevant data to help guide anybody who wants to develop a budget for a model; particularly the information from the consultants was very helpful.

Now, let's look at all of the organizations who

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are working with this. Certainly FWPCA has made a study of Lake Erie; the Ontario Water Resources Commission has a lot of talents; the Canadian Ministry of Mines and Energy and Resources has done a great deal of studying not only on data on the lakes but on modeling, too; similarly, the Great Lakes Commission is getting into this, the Great Lakes Basin Commission; IJC, in its report, will no doubt talk about the need for a model.

It would be my suggestion that we bring together the States, the IJC, the Great Lakes Basin Commission, the FWPCA, the Ontario Water Resources Commission, the appropriate Federal agency, and in Canada -- there are possibly two of them -- the Ministry of Health and Welfare and the Ministry of Energy and Mines -- and get them to attempt to jointly plan and budget a cooperative modeling study of Lake Erie.

MR. EAGLE: You are suggesting another meeting for this purpose?

MR. LYON: Yes. I think it is essential, because from what Ralph Purdy has said, there already is another agency planning to budget \$1 million for a separate model which is certainly something we don't want.

MR. STEIN: Let me just raise a very relevant factor about your suggestion.

I don't know how it is with your States but --

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I know you can go up to your counterparts in the Provinces of Canada, but in the Federal Government, you don't quite operate that free and easy, and I think this is for good reason.

The State Department is the coordinating department. In other words, unless we work through IJC, we, in the Federal Government, except with the approval of the State Department, cannot arrange the joint meetings with Canada or any other foreign government.

MR. LYON: All right, let me comment on that.

I think that problem is very easily solved. The only agency that I have mentioned that is not on the IJC, the International Lake Erie Pollution Abatement Board, is the Great Lakes River Basin Commission. Is that the proper name, Great Lakes Basin Commission? I am sure that the IJC could arrange for them to participate. I think if you ask the International Lake Erie Pollution Abatement Board, on which these States and all of the agencies I mentioned are represented, that they would do this job of putting together a project and a plan for developing this model.

They are now putting together a complete report on Lake Erie and have worked very well together, and I am confident that they can do this, too.

MR. POSTON: Mr. Chairman, I think I agree with

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him wholeheartedly. There is only one agency that has an official study, an official job to go ahead and look into pollution problems on both sides of Lake Erie. Lake Erie to be studied in part on a model study, I think, would be incomplete. I think also that the nutrient problem -- to confine our work to nutrients is something that we can probably handle, and move out later into other things if it is deemed desirable at that time.

I personally hate to see this Conference to be too closely involved into this matter of model studies. I think our job is to clean up this water. I really get concerned sometimes. I think we can recommend this all right, but I like to see us stick to our job here.

MR. STEIN: No one was going to suggest that we study the operation. Now, conferences have done many peripheral things. You know we did deal with the alewife program in Lake Michigan from the Conference. But when we set that up, we turned that over to another group because cleaning up the alewives was another function of the Conference. We were just the catalyst.

Presumably we are doing the same thing here, but I think we have several points. According to Mr. Eagle he claims in this report, and I think, reading just the face of it -- and I don't pretend to have all of the technical knowledge that you eminent gentlemen have --

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but on the face of it, it looks like he is dealing with the nutrient problem all of the way through this. I don't think he has gone beyond it. If he has, I think that is a technical question.

Now, the point is: Do I understand your proposal, Mr. Lyon, that we try to get IJC to sponsor a technical meeting of this type, let them have this report, with whatever comments we have for the purpose of getting the model started and preparing a program and a budget for it?

MR. LYON: Yes, I think that is what we should do. We should also invite the Great Lakes Basin Commission to participate in this, and I think you would be very gratified, Murray, with the results of such an effort.

I might suggest, if it is permissible, Bill Steggles, from the OWRC is here. He has been one of the most active members in the International Joint Commission activities. He might want to react to this informally.

MR. STEGGLES: I am very, very happy to be here.

MR. POOLE: Mr. Chairman, it is 340 miles to Indianapolis and I have to go there tonight.

W. A. Steggles

STATEMENT OF W. A. STEGGLES, ONTARIO
WATER RESOURCES COMMISSION, ONTARIO,
CANADA

MR. STEGGLES: Mr. Chairman, Conferees, and ladies and gentlemen, thank you for the opportunity of coming here today and joining with you.

I have listened with great interest to essentially the entire day's proceedings, and we are really delighted on our side of the lakes with the course that you people are putting -- the emphasis that you are asserting on Lake Erie.

Of course, we feel that Lake Erie is pretty vital to the future of not only the Province of Ontario but to Canada itself. The subject of models, from our point of view, is, we feel, a very desirable planning tool, that you cannot plan successfully unless you take a comprehensive approach to the problem, and only by working together with the States and ourselves do we feel that we could successfully as a community around the lakes achieve this very desirable objective.

I am certain that in speaking this way that I speak for our management and our Commission, the Ontario Water Resources Commission, in support of the suggestion

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that has been made, that this be drawn to the attention of the International Joint Commission; that the International Joint Commission is very conscious of a need for this kind of thing, and that I think with the added weight of this Conference behind all of the expressions that have been made to date in the interest of this type of planning that we would be taking a pretty sound and desirable step in the right direction to achieve the ends that you have spoken of here.

MR. STEIN: Thank you, sir.

MR. STEGGLES: Thank you very much.

MR. STEIN: Mr. Eagle, are you in substantial agreement with Mr. Lyons' approach?

MR. EAGLE: If I understand the motion and his suggestion. If it will be put in the form of a motion, I will be glad to second it.

Will you state it again? You are talking about a meeting, are you not?

MR. LYON: Specifically, I would suggest that we ask the IJC, Lake Erie International Pollution Abatement Board, to meet, to also invite the Great Lakes Basin Commission, and to plan a specific model project on a cooperative and joint basis, and to put the number one priority on the nutrient problem.

MR. EAGLE: I will second it.

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MR. STEIN: I think there is general agreement on that.

I think, in order to save time, we will make that part of the summary, if there is no objection to that.

Now, the next point, and I think this should be --

MR. EAGLE: Mr. Chairman, I don't want this overlooked, but I would like to have this report in the record in its entirety.

MR. STEIN: This report will be in the record in its entirety, because the Conferees did ask for it, and I would like to add that I think this report should be made available to the IJC as the basis of calling the meeting.

MR. LYON: Yes, I think that should be added to my statement that the report should be used by this group as a basis.

MR. STEIN: Yes, because I think this raises all of the questions certainly.

(The above referred to report follows in its entirety.)

REPORT OF LAKE ERIE ENFORCEMENT CONFERENCE TECHNICAL COMMITTEE

on

CONSTRUCTION OF A MODEL

for

ANALYZING AND CONTROLLING

LAKE ERIE WATER QUALITY

LETTER OF TRANSMITTAL

June 16, 1969

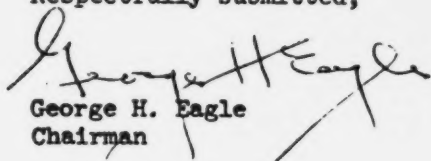
To the Chairman and Conferees
Lake Erie Enforcement Conference

Gentlemen:

The representatives of the Technical Committee for Construction of a Model for Analyzing and Controlling Lake Erie Water Quality is pleased to present this report to the Conferees in accordance with the resolution adopted at the October 4, 1968, session of the Conference.

This report generally represents the discussions, investigations, conclusions and recommendations of the committee.

Respectfully submitted,



George H. Eagle
Chairman

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INTRODUCTION

At the request of the Honorable James A. Rhodes, Governor of the State of Ohio, Secretary Anthony Celebrezze of the United States Department of Health, Education, and Welfare, under authority granted in Section 8 of the Federal Water Pollution Control Act of 1961, called a conference on pollution of Lake Erie and its tributaries. The conference was held in two sessions, in Cleveland on August 3-5, 1965 and in Buffalo on August 10-12, 1965. The conferees were as follows:

Dr. B. A. Poole, Indiana
Mr. Loring Oeming, Michigan
Dr. E. W. Arnold, Ohio
Mr. George Eagle, Ohio
Mr. Fred Mohr, Ohio
Mr. Richard Boardman, Pennsylvania
Mr. Robert Hennigan, New York
Mr. H. W. Poston, Federal Government

The conference chairman was Mr. Murray Stein, Federal Water Pollution Control Administration (FWPCA), Washington, D.C.

After hearing a Federal report on pollution in the conference area, reports on pollution control activities in each of the five States, and statements by others, the conferees agreed unanimously on a summary containing conclusions and recommendations that was later issued by the Secretary of the Department of Health, Education, and Welfare on November 12, 1965.

One of the summary recommendations stated:

"The conferees will establish a Technical Committee as soon as possible which will evaluate water quality problems in Lake Erie relating to nutrients and make recommendations to the conferees within six months after the issuance of this Summary."

Such a Technical Committee was appointed. Their "Report of the Lake Erie Enforcement Conference Technical Committee: was approved by the Conferees on June 1, 1967. The Committee drew a number of conclusions and recommendations including the following:

The Bureau of Commercial Fisheries, the FWPCA, the States, and other agencies should increase the tempo of research programs in Lake Erie to more clearly define all the factors adversely affecting the fishery, municipal water supplies and recreational uses.

Research should also be directed toward the following problems:

- Toxic effects of algae
- Botulism in waterfowl
- Exploration of oil and gas
- Taste and odor problems in drinking water
- Short filter runs at water plants
- Pollution by vessels
- Uniformity of regulations on marine toilets
- Uniformity of fish laws
- Effect of lake levels on Cladophora

There was considerable discussion of the algae problem in Lake Erie at a Technical Session of the Conferees in Cleveland on August 26, 1968, and at the Fourth Session of the Conferees in Cleveland on October 4, 1968. At the latter session, the following resolution was adopted:

"A Technical Committee under the chairmanship of Mr. George H.

Eagle will be established to consider construction of a model for analyzing and controlling Lake Erie's algae growths. Upon request, the Department of the Interior will provide clerical and technical assistance as may be required. The Federal and State conferees will notify Mr. Eagle of their appointments to the committee not later than October 11, 1968.

The committee shall report within six months or sooner, if possible, to the conferees on specific programs including staffing and financing for developing a mathematical model of Lake Erie, monitoring of flow patterns, designation of control areas and deep water dispersal projects as related to nutrient problems, and the feasibility of formulating allocation standards for nutrient discharges on a pound-per-day basis among the five conference States."

The following persons were appointed to the Technical Committee on Lake Erie Studies:

Richard M. Boardman and Kenneth Schoener, Pennsylvania
John Bohunsky, Michigan
George Harlow, FWPCA, Cleveland
Leo Hetling, New York
Oral H. Hert, Indiana
George H. Eagle, Ohio, Chairman

J. E. Richards, George B. Garrett and John E. Kinney of the Ohio Department of Health and Ed Johnson, FWPCA, Washington, D.C., served as resource persons to the Committee. Mr. Richards also served as secretary.

The Technical Committee held four one-day meetings, all in the offices of the Ohio Department of Health in Columbus, October 24, 1968; December 4, 1968; January 23, 1969 and March 21, 1969.

OBJECTIVES

The Committee recommends a program to construct a model for analyzing and controlling Lake Erie water quality. The program should have the following objectives:

1. To develop the basis for an effective water quality and eutrophication control plan for Lake Erie which will permit anticipating effects of various uses and controls.
2. To develop a summary of the information required for evaluation of all influences on the quality of the lake water and for evaluation of the eutrophication processes in Lake Erie. Principal concern is the algal problem but there are also other problems which are of concern.
3. To determine the validity of existing data and the absence, if any, of necessary data.
4. To develop a predictive model for the lake water quality. As a prerequisite the Committee suggests development of several subproject models to furnish input for the predictive model.

COMMITTEE DISCUSSIONS AND INVESTIGATIONS

At the first two meetings of the Technical Committee "to consider construction of a model for analyzing and controlling Lake Erie's algae growths" a listing of the factors that influence water quality of Lake Erie and the probable relationship to its biology resulted in the following:

- (1) Water flow distribution patterns;
- (2) Chemical quality;
- (3) Biological response patterns;
- (4) The relationship between various waste loads and factors (2) and (3); and
- (5) The dissolved oxygen response resulting from factors (1), (2) (3) and (4).

FWPCA water quality models specialists, and other consultants, gave the committee considerable encouragement in the development of models encompassing the above listed factors. It was the consensus that five models would be required initially, one for each of the factors. Subsequently, an overall predictive model could probably be developed from the five.

Accordingly, at the January 23, 1969, meeting of the committee a "Proposed Systems Study for Development of a Water Quality Management Plan for Lake Erie" was developed. (See Appendix A)

Prospective Contractors. Under date of February 14, 1969, invitations for submittal of proposals for the Systems Study were sent to eighteen (18) prospective contractors located in the states bordering Lake Erie. (See Appendix A). Twelve (12) proposals were received. These were reviewed in detail by Mr. George B. Garrett of the Ohio Department of Health, Division of Engineering staff and a resume' was presented to the committee at the March 21, 1969, meeting (See Appendix B). Subsequently, Mr. Ed Johnson, FWPCA, made a review of the proposals (See Appendix C).

In general, the proposals indicated that considerable data and knowledge are available to develop the proposed models. In fact, several of the prospective contractors are presently working on certain phases of the proposed study. One of the major problems in the submittal of formal proposals will be to define the degree of refinement needed for the development of the models.

Administrative-Coordinating Agency. It was the consensus of the states representatives on the committee that an Administrative-Coordinating Agency to manage the program, be retained as soon as possible and that such agency be acceptable to the Technical Committee and Conferees.

Further, the Technical Committee or another committee appointed by the Conferees should serve as a "board of directors" to the Administrative-Coordinating Agency. Also, the Technical Director appointed by the Agency for the study should be a very knowledgeable person in the fields of water quality management and systems analysis. The names of Mr. Kenneth Young, Water Resources Engineering, Austing, Texas; Mr. David Marks, Johns-Hopkins University; Dr. Leo Hetling, New York State Health Department, and Mr. Norbert Jaworski, FWPCA, Chesapeake Field Station were mentioned as examples of the capability needed for the position.

Cost. It may be noted from Appendix B that the cost for the development of the proposed models would approximate \$750,000 to \$1,000,000. In addition, the Administrative-Coordinating Agency would require a budget of about \$100,000 per year or a total of \$400,000 for the program if completed in four (4) years. The committee felt that the program must be financed by all interests - governmental agencies at all levels, industries, private organizations and individuals if it is to have the interest and cooperation required for success.

CONCLUSIONS

1. A key to the overall program for Lake Erie is a predictive model relating mans activities to the lake's water quality.
2. Five subproject models are essential to the development of a final predictive model.
3. There are sufficient data available to permit approximations of the subproject models and to begin the development of a predictive model.
4. There should be a central agency to direct the overall study, since in most instances, there will be opportunity for utilization of findings in one project for assistance in confirming findings in another. This emphasizes the importance of a well qualified Technical Director.
5. Development of the subprojects will permit appraisal of the adequacy and validity of existing data. Periodic reporting by the Technical Director of such findings will permit survey programming to get confirmatory or missing data.
6. The final development of the models in the various subprojects will, for the first time, provide a full appraisal of what is known and what is essential to answer unknowns in the organization of an effective program for the Lake Erie basin. Such an appraisal will guide research by specifying deficiencies, reduce costs of surveys and monitoring by defining proper control points, and allow the development of a final predictive model which can assess effects of various control programs and their costs.
7. The FWPCA and the States should agree to assembling available data from sources within their respective jurisdictions.

RECOMMENDATIONS

1. There should be a joint federal-state development of a program for Lake Erie which would permit appraisal of influences on water quality and controls which can effectively achieve desired objectives.
2. In preparing such a program there should be developed a predictive model which could assess various approaches, costs and benefits. The recommended approach would be to organize the model development in five subprojects which can be carried on concurrently.
3. There should be a central Coordinating-Administrative Agency, which maintains close liaison and guidance of the subprojects.
4. The development of the subprojects should utilize existing data and unless it can be shown that essential data are lacking, the initial approximation should be limited to existing data. Confirmatory data may be developed in subsequent studies. The states and FWPCA should assume responsibility for compiling data within their respective jurisdictions.
5. If the Conferees agree that the five subproject models and a predictive model should be developed, then the funding to the extent of about \$400,000, should be sought at once to permit retaining a Central Coordinating-Administrative Agency to (1) prepare specific detailed contract proposals for subproject contractors, (2) coordinate the collection of existing data from the various agencies, and (3) endeavor to obtain funds for the entire study recommended by the Technical Committee.

JAMES A. RHODES, Governor

EMMETT W. ARNOLD, M.D.
Director of Health

450 East Town Street
P.O. Box 118
Columbus, Ohio 43216

State of Ohio



Department of Health

Appendix A

PUBLIC HEALTH COUNCIL

Mr. Von H. Klepinger 485

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J. F. Mear, Ph.G.

Phillip T. Knies, M.D.

Lloyd E. Larrick M.D.

February 14, 1969

Re: Informal Proposals for Study of
Management Plan for Lake Erie

Gentlemen:

At the Fourth Session of the Enforcement Conference on the pollution of Lake Erie, a technical committee was formed. This committee was charged with investigating the feasibility of carrying out a system analysis study of Lake Erie as an aid to managing the lakes eutrophication problem. The committee, with representation from the five border states and the Federal government has met several times to discuss the proposed study. As a result of these meetings, a description of the type of study which appears most desirable was written.

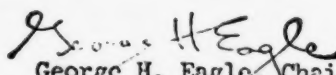
In order to further determine the feasibility of the study, to obtain a list of potential contractors and an estimate of the time and funds required to carry out the work described, copies of the study description are being sent to potential contractors, such as yourself.

If after reviewing the attached you are interested in any part of the study, please prepare an informal proposal and submit it to me by March 10, 1969. Such proposals should include the following information:

1. Are you interested in any phase of the study?
2. What are your general capabilities for carrying out the study phase in which you are interested in?
3. What suggestion would you have for modifying the study plan?
4. What data would you require to carry out the study? Is this data available and can you obtain it?

5. What time schedule would be feasible for carrying out the work?
6. What order of magnitude of cost might be expected for carrying out the work?

Very truly yours,


George H. Eagle, Chairman
Technical Committee on
Lake Erie Studies

Enc.

Proposed Systems Study
for
Development of a Water Quality
Management Plan for Lake Erie

The overall objective of the study is a systematic study of Lake Erie's Eutrophication problem in order to develop a water quality management plan. In order to carry out the project it will be broken down into five specific sub-projects which will be coordinated by a central project staff. In general, it is expected that the sub-projects will be carried out by contract under the following conditions:

1. The objective of the study is to develop the model as far as practical utilizing existing data. Therefore, no field or laboratory studies are to be carried out unless the absence of vital data is clearly demonstrated. The need for such additional field or laboratory data must be clearly indicated in the project proposal.
2. Based on the data needs outlined in the preliminary proposal, the interagency committee will contact Federal and state agencies to determine the availability of the data and conditions for its utilization.
3. Recommendations for specific data collection systems or special studies which will increase the accuracy of the model will be expected as part of the study results.
4. Sub-contracting and consultation with other groups with expertise or data in the area of interest is encouraged.
5. As part of the preliminary proposal, the contractor is to propose procedures which could be utilized to provide verification of the model.
6. Sensitivity analysis on the significant parameters will be carried out as part of the study.
7. All computer programs will be required to be operational on the computer system specified.
8. Specific rigid, detailed time schedules will be established. Such schedules are necessary if all phases of the study are to be coordinated and completed in a reasonable time.
9. Quarterly progress reports will be required.

The following more detailed description of each sub-project is presented as guidelines to what is expected. One method of approach is suggested. Other approaches to the problem will be considered.

CENTRAL PROJECT STAFF

Functions -

- (a) Negotiate and monitor the sub-project contracts.
- (b) Coordinate the sub-projects in such a way that the programs are compatible in accuracy, computer systems, etc.
- (c) Develop the necessary linkages so that the models can be used jointly.
- (d) Keep coordinating committee informed of progress so that when there is sufficient achievement in developing these sub-projects a final linked model can be proposed which would permit projections on effect of various control proposals and an estimate of capital and operating costs.

SUB-PROJECT I

Problem - To develop a model capable of demonstrating flow patterns in the lake and predicting paths of flow of point discharges.

Suggested Method of Solution -

This basically physical model will describe mixing and diffusion as affected by currents, physical characteristics of the lake, inflows, wind and lake level and at a scale adequate to permit extension to local area definition of flow patterns.

Example of Questions Models Should be Capable of Answering -

1. A determination of which sources (point of tributary) effect areas of the lake in which algal blooms occur.

2. Possibilities of locating physical structures which could influence flow patterns or changes in discharge points which could promote diffusion -- both of which would result in reducing concentrations of elements found essential to bloom development.

SUB-PROJECT II
CHEMICAL QUALITY

Problem - To develop a model capable of predicting the resultant chemical quality in the lake of various levels of waste discharges.

Suggested Method of Solution -

(a) A model which in conjunction with the flow pattern model describes mixing and diffusion of conservative materials in the lake. It should be capable of predicting the resultant concentration of any conservative substances introduced into the lake from any point or non-point source. The possibility of dividing the lake into two or more basins should be considered.

(b) The above model should be expanded to account for a non-conservative substance such as BOD or NH_4 when the sources, sinks and rate of degradation are known.

(c) The above model should be specifically adapted to describe the temperature, BOD, DO, N and P cycles so as to predict conditions in specific areas of the lake under different load conditions.

Examples of questions model should be capable of answering -

1. For given waste discharges what chloride concentration will occur at Longitude 77° and Latitude $43^\circ 50'$ in 1985.
2. What total P concentration can be expected at the above point if the waste treatment plants surrounding the lake achieve a uniform 58% P removal? If specific discharges are reduced?
3. If a pesticide manufacturing plant located at Dunkirk, New York has an accident and discharges 10 tons of Pesticide X with a decay rate of 0.1, what concentrations can be expected to occur at a water intake at Buffalo, New York.

SUB-PROJECT III

ALGAE RESPONSE

Problem - To develop a model which will predict the algae conditions for given chemical and physical conditions in the lake.

Suggested Method of Solution -

(a) A review of all existing algae, chemical and physical data on the lake will be made as well as personal interviews with ecologists, limnologists and biologists who have expertise in this area.

(b) From the above data, statistical correlation between algae conditions (number, chlorophyll concentration and diversity) and the chemical and physical data should be made.

(c) The statistical results should be integrated in the light of the theoretical knowledge of the experts interviewed.

(d) A final model relating chemical and physical quality of the lake with the rate of growth and quantity of algae should then be constructed. It may be necessary to develop different models for different areas of the lake, such as the deep water center portion, or the shallow shoreline.

Example of Questions Models Should be Capable of Answering -

1. What are the apparent essential element concentrations to cause algal blooms (and define blooms)?

2. What are the chemical and physical factors which differentiate bloom and non-bloom areas and/or occurrences in the same area?

3. If the following chemical and physical conditions exist in the vicinity of the Cleveland water intake, what algae conditions should be expected.

P = a

Temp = e

N = b

Current Velocity = f

BOD = c

Cl = d

SUB-PROJECT IV
EFFECT OF WASTE LOADS

Problem - To determine the effect of varying degrees of treatment for waste being discharged to Lake Erie and its Tributaries.

Suggested Method of Solution -

(a) A complete inventory of present and future point source waste discharges to the Lake and its tributaries should be completed. Most of the data required for such an inventory is available from the State and Federal water pollution agencies files.

(b) A similar inventory of tributary loads should be developed which (by subtraction of known point source loads) can provide estimates of natural and agricultural loads and their variability with season and precipitation.

(c) Projection of raw waste loading to the Lake and its tributaries for the next twenty years should be made. Here again, data should be readily available from previous economic base studies made of the area. The main task of the sub-project will be to gather together and systemize the existing data.

(d) Specific load curves for various degrees of treatment for the major wastes sources (<1 MGD) should then be developed. Actual data for each plant should be utilized. Curves for BOD, SS, Total P and Total N will be required. Generalized curves for the smaller plants (<1 MGD) should also be developed.

(e) All of the above information should be computerized so that rapid access to the information is possible.

SUB-PROJECT V

Problem - To determine the causal relations effecting dissolved oxygen in the central basin at times of occurrences of thermocline.

Suggested Method of Solution -

(a) A determination of the relationships of lake level, elevation of thermocline, oxygen level, temperature and such other physical factors as may be involved.

(b) A determination of the quality characteristics of the bottom sediments and their relationship to oxygen consumption.

(c) A determination of the mechanics of utilizing bottom sediments and biota in the lake during oxygen depletion occurrences.

(d) A determination of the kinetics of oxidation - reduction reactions occurring in the central basin.

(e) A determination of zones influenced by the oxygen changes which could later be related to influence on fisheries.

RESUME OF VARIOUS PROPOSALS

Battelle Memorial Institute ✓

Interest - All Sub-projects

- Comments - a. Would add literature research and data accumulation sub-projects.
- b. Hierarchical modeling approach with continuous inter-linkages using either a deterministic or Monte Carlo basis.
- c. Sub-project III broaden to include overall biological response including important commercial species and those important to food chains.

Proposed Models and General Technique.

A. Flow distribution

1. Three demensional thermodynamic analyses.

B. Chemical Quality

Would use mass transport concepts and a typical mixed tank model segmented as may be necessary.

C. Biological response

1 Will include

- | | |
|-----------------|-------------|
| a. Algae | e. Protozoa |
| b. Bacteria | f. Benthos |
| c. Fungi | g. Fish |
| d. Zoo plankton | |

Would use a modified mass transport and decay approach.

D. Waste Loads

General approach

E. Dissolved Oxygen Response

1. Diurnal variations
2. Annual variations

Would break lake into a series of tanks and connecting pipes.

Cornell Aeronautical Laboratory, Inc.

Interest - All Projects

- Comments - a. All projects should be carried out by a single contractor.
- b. Suggest an overall water management Set of models interlinked to the proposed 5 sub-projects.

Proposed Models and Techniques

A. Flow distribution

1. A two layer model
2. A general thermodynamic approach

- B. Chemical quality
Mass transport approach
- C. Algae response
Limited to correlation of algae counts of a few species
with meteorological conditions and concentrations of
nutrients.
- D. Waste loads
General approach
- E. Dissolved oxygen response
Diurnal variations
Two layer model

Franklin Institute Research Laboratories

Interest - All projects, however, proposal covers only sub-project 1-4
suggested Models or Projects

Comments - a. Sub-project 5 is not closely related to other 4 sub-projects.
If desired, would make a separate proposal.

1. Accumulation of data and construction of preliminary model.
(Divide Western basin into finite pools (suggest 12)
sequential additions to the upgraded preliminary model
2. Upgrade preliminary model and construct chemical quality
model.
3. Algae response model
Multi-variate analysis
sequential additions to the chemical model
4. Add on economic model to (2) and (3).
5. D.O. model.

Hydroscience, Inc.

Interest - Sub-projects II, III, V

Comments - Emphasis should be toward answering directly and quickly those
problems which are amenable to solution by models which are now
substantially completed. These models should be verified and
from them more complexed models developed.
The first phase would be concerned with:

- a. Long-term variation of conservative and non-conservative
water quality constituents.
- b. Seasonal variations in water quality.
- c. Seasonal succession of phytoplankton and high trophic levels.
- d. Steady state analysis of the spatial variation of the above.
- e. Preliminary analysis of time variable, multi-dimensional
systems.

Results of above may be sufficient for engineering solutions and further refinement not necessary. If not, the following Phase II is recommended:

- a. Flow model (Sub-project ^I~~II~~)
- b. A thermocline model.
- c. Further development of Phase I.

Michigan, University of

Great Lakes Research Division

Interest - Sub-project IV

Comments - Will serve as administrative unit for the University effort. Believe proposal of committee is unrealistic and would encounter almost certain failure.

Michigan, University of

School of Public Health

Interest - Sub-project III

1. Review modeling techniques for biological systems.
2. Review availability of data.
3. Design a model for a small homogeneous area.
4. Expand (3)
5. Verify (4)
6. Use model to predict changes in water quality.

Monsanto Research Corporation ✓

Interest - All projects

Comments - Firmly believe their capabilities are more than sufficient to develop the required models.

Suggested Models

I Transport Model

- a. Phase I deterministic model based at first on a limited number of variables.
- b. Phase II stochastic model if Phase I is not sufficient.

II Chemical systems analysis

- a. Approach similar to that of Sillen, Kramer, Stum (steady state equilibrium)
- b. From (a) develop a reaction kinetics model.

III Biological model

- a. Relate algae population to physical, biological and chemical factors.

Ohio State University

Interest - Some phases of all projects but particularly Sub-projects I, II, III.

- Comments - a. Suggest a basin by basin approach; i.e., western basin, then central and eastern basin.
- b. First three sub-projects so interrelated that separation would be difficult.
- c. It seems unlikely information for sub-project III is available.

Quirk, Lawler & Matusky Engineers

Interest - Sub-projects I & II

- Comments - a. Three-dimension time variable mass transport approach.
- b. Would suggest a two-phase approach.
1. Complete mix steady state conditions overall view.
 2. Breakdown into smaller units for refinement.
- b. Item a sub-project II is more properly a part of sub-project I. Sub-project II would then be primarily related to decay kinetics.

Phase I 3-6 months

Phase II 12-24 months

Syracuse University

Interest - Sub-project II

- Comments - a. Divide lake into two regions
1. Western basin
 2. Central and eastern basins

ADDENDUM

Carnegie - Mellon University

Interest Flow distribution (Sub-project I)

- 1 A general thermodynamic approach.

Rensselaer Polytechnic Institute and New York
State Health Department

Interest Waste loads (Sub-project IV)

General approach

SUMMARY OF PROJECT INTEREST, ESTIMATE COST AND TIME FOR COMPLETION

LAKE ERIE WATER MANAGEMENT PROGRAM

Organization	I	II	Sub-Projects III	IV	V	Total
Battelle Memorial Institute	\$93,300	108,600	150,200	91,100	75,000 (3)	\$392,000 18 mos.
Carnegie-Mellon University	200-300,000 24-36 mos.	-	-	-	-	-
Cornell Aeronautical Laboratory, Inc.	100,000 12 mos.	150,000 15 mos.	100,000 18 mos.	160,000 24 mos.	100,000 18 mos.	500-750,000 30 mos.
Franklin Institute Research Lab.	275,000 24-36 mos.	50,000 21 mos.	75,000 30 mos.	50,000 27 mos.	-	450,000 48 mos.
Hydoscience, Inc. (2 phase proposal)	- -	X -	X -	- -	X	I 200-350,000 II 200-350,000 I 12-24 mos. II 24 mos.
Michigan, University of - Great Lakes Research Div.	- -	- -	- -	49,000 12 mos.	- -	- -
Michigan, University of - School of Public Health	- -	- -	53,000 24 mos.	- -	- -	- -
Monsanto Research Corporation (2 phase proposal) (for Sub-project I)	I 250,000 II 250-750,000 I 12 mos. II 12-18 mos.	150,000 15-18 mos.	100,000 9-12 mos.	- -	- -	- -
Ohio State University - Water Resources Center	X -	X -	X -	- -	- -	300,000 24 mos.
Quirk, Lawyer & Matusky Engrs. (2 phase proposal)	I 30-50,000 II 100-200,000 I 3-6 mos. II 12-24 mos.	I 30-50,000 II 75-150,000 I 3-6 mos. II 12-24 mos.	- -	- -	- -	300,000 24 mos.

	I	II	III	IV	V	Total
Rensselaer Polytechnic Institute	-	-	-	108,000	-	-
New York State Health Department	-	-	-	15 mos.	-	-
Syracuse University	-	260,000 48 mos.	-	-	-	-

- (1) Exclusive of computer time.
 (2) (X) indicates interest in only these projects.
 (3) Sub-contract by others.

FWPCA REVIEW

OF

Preproposals for Study of a Management Plan for Lake Erie

Six preproposals were reviewed. Two respondents propose to cover the five subprojects; four would cover no more than three subprojects. The following table, in alphabetical order, summarizes the response:

<u>Respondent</u>	<u>Subproject</u>					
	I	II	III	IV	V	VI*
1. Battelle Memorial Institute	X	X	X	X	X	X
2. Cornell Aeronautical Laboratory	X	X	X	X	X	
3. Hydrosience		X	X		X	
4. Michigan, University of			X			
5. Monsanto	X	X	X			
6. Quirk, Lawler & Matusky	X	X				

*Additional subproject suggested by Battelle

Of the six, Battelle, Cornell, and Monsanto specified their approaches in considerable detail. Battelle and Cornell are experienced in the specialties required and in Lake Erie studies. Monsanto's forte is their computer facility and mathematical modeling. Hydrosience has recent experience in a chemical quality model. The University of Michigan (Deininger-Bender) proposes a small-scale attack on a large complex problem. Quirk, Lawler & Matusky are nonspecific in detail.

Rankings are a consensus of those reviewing the preproposals. The absolute rank obliterate any small differences in potential performance. Hence, two or more of the top-ranking may be nearly equivalent. The following table summarizes the ranking. Respondents are identified by the numbers in the alphabetical list in the table above.

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<u>Rank</u>	<u>Subproject</u>					
	I	II	III	IV	V	VI
First	1	2	5	1	1	1
Second	2	1	1	2	2	-
Third	5	3	2	-	3	-
Fourth	6	5	3	-	-	-
Fifth	-	6	4	-	-	-

Comments relative to ranking appraisal are given. More detailed comments are given in the second attachment.

Two respondents made preproposals for the whole study. They are ranked in order of overall quality and potential for success.

Battelle. Presentation is explicit and concise. All models are linked logically. Staff and past performance rank high.

Cornell. Presentation is specific. The algal response model is weak because it is limited to a statistical correlation. Staff and past performance rank high.

For each subproject all proposing companies are ranked:

Subproject 1 Flow model

Battelle. Good, well developed proposal.

Cornell. Proposes a valid assumption of a simplified two-layered model.

Monsanto. May not be aware of potential for adapting related models.

Quirk, Lawler & Matusky. Nonspecific.

Subproject II Chemical quality

Cornell. A grid model to overlay the hydraulic model is probably a good approach.

Battelle. Assumption of a mixed tank appears valid in the segmenting approach suggested.

-3-

Subproject II Chemical quality (continued)

Hydroscience. Experienced with Raritan Bay study.

Monsanto. A full-scale kinetic model is probably overelaborate.

Quirk, Lawler & Matusky. No proposal.

Subproject III Algal response

Monsanto. Grid system to superimpose algae on chemical quality seems good. Similar studies in progress.

Battelle. Suggests partial differential equations; elegant solution.

Cornell. Statistical correlation. Anticipate weak results.

Hydroscience. Response not consistent with request.

University of Michigan. Proposed statistical correlation would require large volume of good data.

Subproject IV Effect of waste loads

Battelle. Discharge simulation is a good idea.

Cornell. Dependent on existing studies and consultation with FWPCA. Would consider contributing discharges as well as lake body.

Subproject V Dissolved oxygen response

Battelle. Would subcontract to Ohio State University: well qualified.

Cornell. Not as much detail to judge; stratification considered.

Hydroscience. Simple stratified model.

Summary of Preposals by Each Respondent

Battelle Memorial Institute

Battelle-Columbus proposes to perform all five subprojects into a overall plan of water quality management for Lake Erie. An additional subproject is suggested on comprehensive acquisition of literature and its relation to all parts of this project.

Subproject I Flow model

By determining the functional importance of all pertinent physical phenomena, complex equations and a correspondingly complex model would be minimized. This approach makes good sense.

Subproject II Chemical quality

The model would be adaptable as a whole mixed tank or as any specified portion as an approximate entity. The model would be a mass transport model with chemical kinetic terms. The flexible nature of the proposed model would allow practicable attention only to the refinement and scope required for each substance.

Subproject III Biological response

The need for a comprehensive approach to analyze the biological communities -- algae, bacteria and fungi, zooplankton, protozoa, benthos, and fish -- is emphasized. Interaction among all categories is important. Time-dependent partial differential equations would represent individual compartments of the biota. A realistic approach in using various levels of models would make best use of available information and indicate where future efforts should be aimed.

Subproject IV Waste loads

This ultimate model would assess the ecological response of the lake to various policies of pollution control and water quality management. The submodel would simulate waste discharges into the lake and its tributaries.

-2-

Subproject V Dissolved oxygen response

Several approaches to this model are possible. At least two cycles are apparent in the dynamics of dissolved oxygen - annual and diurnal. The optimum form of the model would be determined by available information and the relation of this model for others and the whole management model. BMI suggests subcontracting this to Ohio State University and monitoring the effort. OSU expertise would then be introduced and interact to benefit other subproject models.

Subproject VI Literature

A proposed subproject for literature and data acquisition would be subcontracted possibly to University of Michigan. This is a sound suggestion.

Battelle Memorial Institute has highly qualified personnel and extensive research experience both in the technical fields involved and in the study of Lake Erie.

Cornell Aeronautical Laboratory Proposal

CAL would perform all five subprojects. They suggest a single contractor to insure compatibility of results. Their analysis of the interrelationships of the subprojects presents a strong argument for one contractor to coordinate all subprojects.

Subproject I Flow patterns and prediction of flow paths at point of discharge

The assumptions and simplifications appear reasonable. Seasonal stratification requires a two-layered model. Important variables are discussed in a way that indicates practical familiarity with the basic problem. Conservative substances would be handled by this model.

Subproject II Chemical quality model

A three-dimensional grid related to the flow model would be used to describe each substance of interest. Nonconservative substances, seasonal variations, interacting substances, and cyclic actions would be considered.

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Subproject III Algae response model

To form a comprehensive model is recognized as an immense task. A limited effort such as statistical correlation of various observed algae count with coordinate data is proposed. The proposal is weak in this subproject compared to the approaches proposed by others.

Subproject IV Effect of waste loads

Would consider tributary discharges and their reaction effects. Considerable dependence on published data and consultation with FWPCA and others would be necessary.

Subproject V Model of DO in Central Basin

Viewed as an extension of I, II, and III. Effects of stratification important. Output would be general description of what is occurring in the basin as a function of interrelated factors.

CAL has highly qualified personnel and research experience in closely related projects. They have researched numerous fluid flow problems and the hydrologic and energy budgets and water transport characteristics of Lake Erie.

D. J. O'Connor - Hydroscience, Inc.

Subproject II Chemical Quality**III Algae Response****V D.O - Thermocline Study of the Central Basin****Subproject II**

Hydroscience, Inc. has conducted a study in Raritan Bay which answers the quality pattern and intensity type of question posed in Subproject II. It is reasonable to believe they can also do this in Lake Erie. In the past they made a first cut at the Lake Erie problem but it is not as detailed as the current request.

Subproject III

Hydroscience, Inc. conducted a study including algae growth in the San Francisco Bay-Delta Project. It is not clear what was done in this study. The proposed analysis does not indicate any correlation studies to define predictors of algae conditions. Section d in the project request by the State of Ohio and the Enforcement Technical

-4-

Subproject III (continued)

Committee seems to be interpreted by Hydrosience, Inc. in a manner not consistent with sections a-c. This should be discussed with Hydrosience, Inc. to resolve any differences. As proposed, this part of the Hydrosience, Inc. proposal should not be funded.

Subproject V

Hydrosience, Inc. is prepared to carry out a simple stratified study of Lake Erie assuming complete mixing in both the epilimnion and hypolimnion. This type of study should be sufficient for a first cut at the problem to give approximate answers to the effects of pollution in the Lake. This part of the proposal does not attack the actual questions in the form of the "Suggested Methods of Solution," posed by the Enforcement Technical Committee. The answers to the questions posed may not be within the scope of expertise of Hydrosience, Inc. This is perhaps why two added years and a doubling of costs are involved in responding to this request.

Deininger-Bender - University of Michigan School of Public Health

Subproject III Algae Response "Proposal for Modeling the Productivity of a Lake Ecosystem"

The request from the technical committee of the Lake Erie Enforcement Conference basically asks for a set of predictors of algae location and intensity given an input of chemical and physical water conditions at various points within the lake (i.e., a map of lake conditions for physical and chemical conditions is an input. The output will be a map of algae conditions). They ask for statistical correlation of algae and the other conditions.

The proposal is not geared to this type of solution but to the whole ecological system in the lake in what appears to be a non-statistical approach. This is truly an ambitious plan but one that would need to be spelled out much more fully before consideration should be given for funding. I expect that these people are well known in their field or they would not have been given the opportunity to respond to the proposal. If this is so, perhaps they should again be contacted to make sure that there was no mistake in interpreting either the request or the response.

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Monsanto Research Corporation

I. Transport Model of Lake Erie

Before making an outlay of between \$500,000 and \$1,000,000 for a 2 to 2 1/2 year study of the transport of water and wastes within Lake Erie, it would be wise to investigate the possibility of using C. H. Lee's 1/ or G. T. Orlob's 2/ estuary model for this part of the study. Some of the people in FWPCA familiar with Orlob's Model are Dick Caswell, Jerry Troyan and Ken Feignor (now at Cornell). Lee's model will be available in September of this year. He and Orlob could also be contacted to determine if their models can be applied to Lake Erie. Monsanto Corporation should be made aware of these models to see if their availability will affect the development cost of a transport model. This part of Monsanto's proposal appears to be the weakest of the three sections.

II. Chemical Systems Model

I do not know if a model involving reaction kinetics in an open environment with varying temperature, pressure, and concentrations of reagents can be developed. Before this type of project is undertaken, a first cut sensitivity analysis should be made using the variables involved in the model. This will at least indicate whether the variables can be measured to an accuracy necessary to obtain meaningful answers from the model. If a sensitivity analysis indicates there is promise to this approach, this section of Monsanto's proposal should be given serious consideration as having the most promise of not only answering questions involving Lake Erie but also in answering many other water quality problems in other lakes and perhaps estuaries and streams in our Nation.

III. Biological Model

Monsanto appears to have begun work on this aspect of the problem already. Their reference number 8

Konstam, A. H., et al., "Exploration for a Statistical Correlation between Algae Growth Rate and Environmental Factors," final report, Monsanto Research Corporation No. 6700, May 1968

may already provide a matrix to superimpose on a quality grid of Lake Erie

1/ C. H. Lee, Graduate Student, Mass. Institute of Technology, Cambridge, Mass.

2/ G. T. Orlob, President, Water Resources Engineers, Inc., Walnut Creek, Calif.

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to delineate algae productivity areas. This part of the proposal appears to be the type of response the Technical Committee of the Lake Erie Enforcement Conference wants.

Quirk, Lawler & Matusky Engineers Proposal

Proposal would be limited to Subprojects I and II. Suggested two phases of development; first, an overview and second, development in detail.

The letter is brief and indicates more detail would be forthcoming (Mid-March).

They state their ability has been demonstrated over the past five years in developing mathematical models and computer programs related to the subprojects.

There is not enough information to make a critical appraisal of their ability. The scope or complexity of any of their previous work is not known.

They estimate the work would take one to two years.

Ralph Purdy

MR. STEIN: Now, the next point is on watercraft waste control, and I think we are in substantial agreement on that.

MR. PURDY: We have a report that we are placing before the Conferees, and I will just briefly state that the committee, chaired by Mr. Granger, who was appointed by Mr. Oeming to act as his alternate, did not call a meeting but carried out their deliberations by correspondence, and by telephone, and they used the Lake Michigan Basin regulations as a starting point.

Now, very quickly I will go down through the chart as to where things stand at the present time.

New York has a regulation or statute that will go in effect 3-1-70. Pennsylvania does not now have regulations specifically directed to control wastes from watercraft. Indiana has a statute that will go into effect 1-1-71; Michigan, 1-1-70. Ohio has one in effect now, but it exempts Lake Erie waters, and it is my understanding that they expect this exemption to be eliminated by legislative action.

Now, in summary, the Lake Erie Basin States are in agreement for uniform "no waste" discharge to the waters of Lake Erie and endorse the recommendations of the Lake Michigan Basin States, and the recommendation of

Ralph Purdy

the Lake Michigan Basin States is attached to the report.

MR. STEIN: Just for a matter of information, Ontario, after 6-1-71, will go along with the incinerator?

MR. PURDY: Ontario has a regulation in effect at the present time. The effective date, 1-1-69, they will approve the macerator chlorinator under special permit until 6-1-71 for boats registered in Ontario.

MR. STEIN: But after that --

MR. PURDY: After that date, it is no overboard discharges.

MR. STEIN: Right. Then, there is complete uniformity?

MR. PURDY: Complete uniformity.

MR. STEIN: I would suggest with this that this is a significant breakthrough, that the States have gotten complete uniformity on the no waste discharge policy from watercraft into the waters of Lake Erie, as I see this, with the legislative and administrative progress in the States.

Unless anyone has any question, I think the States are proceeding with dispatch to bring this about, and I think the Conferees can accept this report as significant progress toward abating the pollution from watercraft, and I think this is about the shortest time you can reasonably expect this to happen.

Ralph Purdy

This report should be accepted, and the only time we will necessarily take this up again is if there are deviations from the schedule, as indicated here, and we find that there is some problem. I don't think there will be any since all of the States are committed to it, and in Lake Michigan this program went ahead without a hitch.

Okay, now, I think that will handle the summary, and the boat pollution, too, and the model.

(The above referred to report follows in its entirety.)

Report of the Technical Committee to Develop
Recommendations for Uniform Regulations to
Control Pollution from Watercraft for the
Lake Erie Basin

June 1969

Pursuant to the recommendations of the Fourth Session of the Lake Erie
Enforcement Conference, the following representatives were designated to serve
on a committee to develop uniform regulations to control wastes from watercraft:

Pennsylvania	Paul R. Heitzenrater, Acting Director Division of Water Supply and Sewerage Pennsylvania Department of Health
Indiana	Oral H. Hert, Director Division of Water Pollution Control Indiana State Board of Health
New York	Joseph Salvato, Associate Director Department of Health
Ohio	Paul Sarossy, Chief Division of Watercraft Department of Natural Resources E. E. Rosendahl, Assistant Engineer General Engineering Unit Department of Health
Michigan	Dale W. Granger, Chief Hydrological Survey Division Bureau of Water Management

Mr. George Harlow was designated to represent the Federal Water Pollution Control
Administration in these matters.

Mr. Granger, as Chairman of the Committee, forwarded to the respective states'
representatives, copies of the recommended regulation which had been adopted earlier
by the Lake Michigan Basin States.

The Committee completed its study by letter correspondence and telephone
communication and did not find it necessary to call any committee meetings.

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It was suggested that the Lake Michigan Basin regulation should be carefully reviewed with the view that it could properly become the basis for a similar regulation for the Lake Erie Basin.

Tabulated below is the status of existing or proposed controls for the Lake Erie Basin States and the Province of Ontario:

	<u>Effective date of regulation</u>	<u>Pollution Control System Approved</u>			<u>Remarks</u>
		<u>Holding tanks</u>	<u>Incinerator</u>	<u>Macerator- chlorinator</u>	
Province of Ontario	1-1-69	Yes	Yes	See remarks	Will approve macerator-chlorinator under special permit until 6-1-71 only
New York	3-1-70	Yes	Yes	No	Pennsylvania does not now have regulations specifically directed to control waste from watercraft.
Pennsylvania	--	--	--	--	
Indiana	1-1-71	Yes	Yes	No	Law now exempts Lake Erie waters. This exemption is expected to be eliminated by the Legislature upon recommendation of the Governor's office.
Michigan	1-1-70	Yes	Yes	No	
Ohio	In effect	Yes	Yes	No	

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The Lake Erie Basin States are in agreement for uniform "no waste" discharge to the waters of Lake Erie and endorse the recommendations of the Lake Michigan Basin States.

PROPOSED ACT
(or Rules and Regulations)
FOR THE DISPOSAL OF SEWAGE FROM MARINE TOILETS

Developed by Subcommittee on "Wastes from Watercraft" - Lake Michigan -
Four State Enforcement Conference. Approved by All Conference, March 2, 1968.

AN ACT (or Rules and Regulations) to regulate the disposal of sewage from
watercraft.

1.0 DEFINITIONS

For purposes of this Act (or Rules and Regulations), unless the context clearly
requires a different meaning:

- 1.1 "Watercraft" includes every description of watercraft, other than a
seaplane, on the water, used or capable of being used as a means of
transportation on water, except vessels engaged in Interstate Commerce and
vessels of foreign registry.
- 1.2 "Sewage" means all human body wastes.
- 1.3 "Litter" means bottles, glass, crockery, cans, scrap metal, junk, paper,
garbage, rubbish, plastic, or similar refuse discarded as no longer
useful or useable (or use definition in own state boating law).
- 1.4 "Marine Toilet" means any toilet on or within any watercraft.
- 1.5 "Waters of the State" means all of the waterways on which watercraft shall
be used or operated (or state definition).
- 1.6 "Person" means an individual, partnership, firm, corporation, association,
or other entity (or state definition).
- 1.7 "Owner" means the person who has lawful possession of a boat by virtue of
legal title or equitable interest therein which entitles him to such
possession (or state definition).
- 1.8 "Department" means the(name of the State agency which shall
administer this Act).

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2.0 LITTERING OR POLLUTING WATER - RESTRICTIONS

Restrictions on placing, throwing, depositing or discharging litter into waters of this State are contained in (refer to appropriate State Act or Rules and Regulations).

3.0 MARINE TOILETS - RESTRICTIONS

3.1 No marine toilet on any watercraft used or operated upon waters of this State shall be operated so as to discharge sewage into said waters, directly or indirectly, unless the sewage has been rendered non-pollutional by passage through a device approved by the Department (or name of State Water Pollution Control Agency if Department and said agency are not the same).

3.2 No person owning or operating a watercraft with a marine toilet shall use, or permit the use of, such toilet on the waters of this State, unless the toilet is equipped with facilities that will treat, hold, incinerate or otherwise handle sewage in a manner capable of preventing water pollution.

3.3 No person shall dispose of sewage, accumulated in a holding tank or any other container on a watercraft, in such manner that the sewage reaches or may reach the waters of this State, except through a sewage disposal facility approved by the Department (or name of State Water Pollution Control Agency if Department and said agency are not the same).

4.0 MARINE TOILETS - POLLUTION CONTROL DEVICES

4.1 After the effective date of this Act, every marine toilet on watercraft used or operated upon waters of this State shall be equipped with a pollution control device in operating condition approved by

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the Department (or name of State Water Pollution Control Agency if Department and said agency are not the same).

4.2 Pollution control devices that are acceptable for purposes of this Act are:

4.21 Holding tanks which retain toilet wastes for proper disposal pursuant to Rule 3.3.

4.22 Incinerating devices which will reduce to ash all sewage and toilet wastes produced on the watercraft. Ash is to be disposed of on shore - not to waters of the State.

4.23 Any other device determined by the Department (or agency) to be effective in preventing pollution from marine toilets.

5.0 ENFORCEMENT

(Refer to enforcement authority of State Boating Act). (or Pollution Control Act).

6.0 EFFECTIVE DATE

The provisions of this Act with reference to requiring watercraft with toilet facilities to be equipped with pollution control devices shall take effect January 1, 1970.

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MR. STEIN: Now, let's move to the easier ones first.

I guess on the surveillance, as I understand it, the FWPCA is charged with surveillance and will continue to make reports to the Conferees on surveillance, is that correct, Mr. Poston?

MR. POSTON: We will do that.

MR. STEIN: Yes. Well, I think that a surveillance report can stet then.

Do we want to say anything to move on more specifics on the agricultural and urban runoff program for the Conferees? Do we want to get down to specifics on programs, on how we are going to do it or not? If not, fine.

MR. METZLER: Well, Mr. Stein, just quickly -- and I don't want to delay this -- but it does seem to me that we ought to be on record as urging more adequate funding both State and federally toward the Soil Conservation Districts and the watershed programs. You heard the Maumee mentioned, and there are three going and 15 applications on hand, and it will be another 20 years before anything really happens in a lot of those. I am mentioning Ohio only because I don't have the same information for New York. But it will take 20 years to get something done there, unless we can get an order of magnitude higher

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of funding from a combination of State-Federal forces.

MR. STEIN: Do all of the States agree with that?

You have got the question not because of lack of sympathy, but because of appropriations law there will be an abstention on this matter by the Federal members of the panel, since we cannot take any position on funding matters.

MR. POOLE: We support it -- Indiana does.

MR. STEIN: Yes.

I assume this is supported all of the way along the line from the State representatives.

Now, let's get to the next point on the removal of phosphorus.

Do we want to come to a judgment on a time schedule, and the evaluation of the States' approaches to the phosphorus removal program? I know this has been a matter that has been a little unclear, and if we can clear it up, I would be delighted.

MR. PURDY: Mr. Stein, again, this is being considered as a part of the International Joint Commission report on Lake Erie, a coordinated program between the States and Canada. Hopefully, this Conference could coordinate their requirements with the International Joint Commission.

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Now, right at the present time, I don't believe we are at liberty to discuss those dates in that they have not been reported to the International Joint Commission, and as such remain privileged communications.

But it would seem strange to have two bodies dealing with the pollution of Lake Erie to present different schedules for compliance.

MR. STEIN: Well, I hope they wouldn't be different schedules, but the Conference did attempt to set up a date for compliance with the phosphates.

MR. PURDY: I realize this, and this is the confusing part of more than one particular body dealing with the pollution of a specific body of water.

MR. LYON: Let me recommend that we make the same recommendation here that was made to the IJC board, and that is that each of the States provide 80 percent phosphate removal by 1972 for direct discharges to Lake Erie, and by 1975 -- isn't that right? -- for the tributaries to Lake Erie. This was the same recommendation that was made to the IJC board.

MR. STEIN: Are there any comments on that? Do the Conferees agree to that?

MR. POSTON: Mr. Metzler made reference this morning to a phosphate requirement that New York has.

MR. METZLER: Well, given an earlier hour and

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adequate time to lay a basis, I would perhaps suggest some modification of this. I think we have neither, and since we have participated in the work with IJC, I think we would support the direct lake discharge removals by 1972 and the indirect ones by 1975.

I might say for New York that we expect to be well ahead of this schedule.

MR. PURDY: I think it should be understood that these are outside dates and that in no way should it modify the existing schedules that call for earlier completion dates.

MR. STEIN: That have been submitted to the Conference.

MR. PURDY: That is right.

MR. STEIN: How about putting it that way, Mr. Poston? On phosphate removal the dates will prevail that are earlier than these dates that have been submitted by the Conferees for individual discharges, but in accordance with recommendations made to the IJC by the States that the outside date for removal of 80 percent of phosphates on a statewide basis will be 1972, direct discharges to the lakes and 1975 for tributaries.

Are there any comments on that?

MR. EAGLE: We would support that.

MR. STEIN: If there are any objections to that,

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I want to hear it, because we have got to get Mr. Poole back.

MR. POSTON: I think we are asking Detroit -- well, that is a direct discharge.

MR. PURDY: Whether it is direct or indirect, there shall be no changes on the earlier time schedule.

MR. STEIN: Detroit is taken care of. It is a specific date for Detroit.

MR. POOLE: It is 1972 for direct discharges, and 1975 for tributary discharges.

MR. STEIN: Except where you have put into the Conference an earlier date for phosphate removal.

MR. POOLE: Well, I just put in 1975 for Fort Wayne, but I am going to be in a hell of a shape to go back to them and tell them they have to do it by 1972 and all of the other tributary places can wait three more years.

MR. LYON: We told our tributary places 1971, and we are not going to change that. I think the understanding should be that these are the final dates, if there is any problem, but we should stick to the schedule that have been submitted.

MR. PURDY: Again, in Michigan's report this morning we stated that 90 percent of the tributary population should have phosphate removal by the end of 1972.

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So this is well in advance of phosphates and I don't think would interfere with what you have got established for Fort Wayne.

MR. POOLE: Well, ours is all of them. I am just looking at the record. We put them on notice in May -- everybody with a population of more than 2000 -- that December 1972 was the date.

Now, apparently Pennsylvania has done that, and Michigan has done that, so why are we relaxing to 1975?

MR. POSTON: And evidently New York feels that way. There is going to be a tighter date than 1975 probably.

MR. LYON: The problem is that not all of us -- on the tributaries -- are up to 1972.

MR. POSTON: I think you have a terrific job to sell a community that is discharging direct to the lake that they have to put theirs in before the guy upstream who might only be a mile up there, and it is very difficult to do a selling job on that man that is one mile up the stream and would be considered a direct discharge.

MR. LYON: But, Wally, I think you will find that that is the exception. Most of them are more than a mile up. Usually those are small ones. The big ones are quite a ways up.

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MR. POSTON: I'd even go for 10 or 20 miles.

MR. POOLE: As I understood the phosphate problem as far as the algae in Lake Erie was concerned is the origin of the phosphates makes no difference. If a hundred pounds comes out of Fort Wayne, Indiana, and gets in through the Maumee, it fertilizes just as much algae as a hundred pounds that comes out of Toledo.

MR. METZLER: Mr. Chairman, I think we had an agreement here, but in the event that there is any great difficulty, I think so far as New York is concerned, we could live with the 1972 date for upstream as well as the others because we intend to meet them.

MR. LYON: So could we. I think basically it is up to Ohio. (Laughter)

MR. EAGLE: Big deal. You are talking about nine plants; I am talking about 132.

MR. PURDY: I just jumped in along beside you, George.

MR. STEIN: What would you prefer, 1972 and 1975? I think Mr. Poole may have some problems with that.

Are you for the States?

MR. POSTON: He has already said 1972.

MR. PURDY: Like Mr. Remus this morning, I don't intend to tell the Conferees something that we cannot

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carry out in the way of an enforcement program, and I am not of the opinion that we can carry out an enforcement program that would bring one hundred percent of the communities in the Lake Erie Basin in the phosphate removal by 1972 when we are also looking at the Lake Michigan Basin, and that under prior conclusions has established some priorities that we must meet, and we cannot do it.

MR. STEIN: I thought you were in pretty good shape, Ralph, if you said 90 percent of your people would have phosphate removed, or 90 percent of the wastes would have phosphate removed by 1972. You just required an 80 percent reduction on a statewide basis. That would come pretty close.

MR. PURDY: Ninety percent will have an 80 percent total of phosphate removal. If you are satisfied with that, I am satisfied with that.

MR. STEIN: What is your date, Mr. Eagle?

MR. EAGLE: We have some as late as 1975 in existing plants.

MR. STEIN: Are they on tributaries or direct?

MR. EAGLE: Yes, tributaries.

MR. POOLE: I will buy the 1972 and 1975, and worry with the Indiana cities, and might come back to you for an extension of one if I have too many problems.

MR. STEIN: Well, if you --

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MR. METZLER: We have an agreement, Mr. Chairman. Let's go.

MR. POSTON: I see great concurrence on the part of the Conferees; majority concurs that 1972 is a reasonable date for them, and I recognize that Mr. Eagle does have a problem and his problem is with about 40 percent of his load, and I hate to see us go back to 1975, which is six years away, about, for a final date here when we have got a resource here. This is really the hard part of the job to get this phosphate out here and to protect this lake.

This is really the job that we are here for. This is the biggest thing that we have got going.

MR. METZLER: There is some virtue in consistency, Wally. What did you vote for, representing the United States, when the IJC handled this problem? What were the dates you agreed on, representing the Federal Government?

MR. POSTON: I think nineteen -- this was a problem of negotiation. (Laughter)

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MR. STEIN: Let me try to do this: I want to get a formulation that we can buy here and live with.

Let us suppose -- let's try, with the slippage we are going to have -- and I don't care if you put in this reduction by 1972 or 1973 -- take your pick -- but the Congress recognizes that this subject of phosphate removal is not just a question that can be solved on one side of the border, that we recognize IJC is going to take this up, and that when the IJC formulation comes out, we will reconsider this problem in order to get the consistency.

Now, any date, again -- with the proviso that any date that the Congress has put in which is prior to either 1972 or 1973 is one that we will stay with, because I don't think this is going to be one that is going to be easily resolved, and we are going to have to modify for IJC anyway.

What would you suggest the date we pick, 1972 or 1973 as the first go-around? Will you have 100 percent by 1972, Ralph?

MR. PURDY: Close.

MR. STEIN: All right. Let's do that, because we have got to do this. We are asking the Conferees if they will agree that except where the dates are set earlier the target date for 80 percent phosphate removal

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is going to be 1973, recognizing that this is not just a problem on one side of the border, that the International Joint Commission is going to take up this problem, and when the International Commission takes up this problem and formulates its recommendations, we will reconsider this in an effort to make the conference recommendations consistent with the IJC recommendations. I think that will push us as far ahead as we can.

MR. PURDY: The earlier dates as presented here will prevail.

MR. STEIN: Will prevail. That will be it.
Okay?

MR. EAGLE: I want to make this one thing clear: You are talking about 80 percent reduction in the total State load?

MR. STEIN: Yes, sir.

MR. POSTON: Municipal-industrial wastes.

MR. STEIN: No, industrial-city.

MR. EAGLE: You didn't say that.

MR. STEIN: That was not open. I think the only thing was the date. I think we can live with that, George, and work the program ahead.

MR. EAGLE: I am glad you can.

MR. STEIN: Well, I tell you, I can see -- let me go off the record here.

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(Discussion off the record.)

MR. STEIN: Let's go back on the record.

Let's go to the gun issue on the reports -- abatement from municipalities, industries and Federal installations. Are those behind schedule?

Now, what is the recommendation that we make these? Do we consider these substantial compliance? Do we consider them out of compliance in the next step? Do we consider these dates that we are going to have the first big shakedown after we set that relatively uniform date in 1970, and these are the dates we will consider reasonable from here on, or what? What are your views?

MR. PURDY: I am not sure I can understand the question, it is so complicated.

MR. STEIN: The question isn't very complicated. The question is very simple. We had a 1970 date for all municipal sources to put in secondary treatment plus disinfection of the effluent, and the industries to have a commensurate program, all plants being operating by 1970.

It seems to me abundantly clear that the dates are not going to be met in very, very many cases. What do we do about this? This seems to be the heart of the case. What kind of recommendation do we want? Do I hear

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anything on that?

MR. PURDY: Mr. Stein, I am not sure whether it was a 1970 or a 1971 date on the original, and I am not sure that that is too important but --

MR. STEIN: In a few cases, in 1971; that is correct, yes.

MR. PURDY: I don't believe that, at this point in time, and with the progress that has been shown by the major municipalities that presented statements directly here today, that anything is to be gained by saying they are not in compliance and initiating the second step in this enforcement proceedings.

Certainly, I think all of the Conferees, and I am sure that the municipalities themselves, regret the slippage that has taken place in the time schedules.

At the time that the original time schedules were established, it was known that they were tight schedules, particularly if you had an operating plant of several hundred million gallons a day and were attempting to construct additional facilities around this and maintain this in operation.

So, therefore, in view of the financing difficulties, the technical difficulties, I would suggest that the reports that have been presented here today are reasonable and in view of the circumstances that have

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been presented.

MR. STEIN: As I understand Mr. Purdy's position -- and let me modify this just slightly, if you will buy the modification -- that we accept the reports of the States as representing -- under the existing circumstances and the complexity of the situation -- a substantial compliance with the program, that the municipalities and industries concerned have indicated that they have made a bona fide effort to clean up and comply, and in those cases where such bona fide effort was not evident, the State agencies have taken appropriate legal action and have them under process.

MR. POSTON: I think it is very difficult for me to analyze all of the numbers of communities here in the reports that have been brought in today, and I wondered if it would be in line to make as a part of our summary a tabular compilation by States of those that are in compliance and those that are behind schedules, to make it a part of this record, and the States might submit this, or I could ask our staff to develop this from the information that was presented here today.

MR. STEIN: Well, I would prefer, if we do this, that the States submit --

MR. POSTON: I would, too --

MR. STEIN: -- that the States submit a list.

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Do you want to? Is this agreeable?

MR. EAGLE: I thought it was in my report.

MR. POOLE: I have the report.

MR. EAGLE: What more do you want? It is in the report.

MR. STEIN: Well, what do you think, Mr. Poston?

MR. POSTON: Well, I think, as we pass something on, I think we could summarize these reports which are, as you know, quite voluminous, and merely get at the progress that has taken place, and this would be the way to evaluate that.

MR. STEIN: Let me again go off the record here, if I may.

(Discussion off the record.)

MR. STEIN: Let's go on the record.

My suggestion is that we consider either putting out from Washington or from Chicago a list -- if the Region considers it appropriate -- of those communities which are in compliance and those communities which are not in compliance and make these available.

I would go on to say that I believe if anyone gets a copy of the record and reads it, they can find this out for themselves. I don't think there is any

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secret. This is a matter of public knowledge.

Are we set, then, with this?

MR. POOLE: How are you going to summarize it for the Secretary?

MR. STEIN: No, I just said that. I will say it again.

We will say that in view of the circumstances involved, the complexity of the situation, difficulties in financing, the magnitude of the job, that, on the whole, most of the cities and the industries are in substantial compliance with the recommendations even though, in many cases, there is slippage in the time they are going to take to accomplish the result. However, they are going to provide the kind of treatment agreed on.

Now, in the vast majority of the cases, there has been a bona fide effort of the communities and the industries to comply, and in the few cases where there have been evidences that such a bona fide effort has not been forthcoming, the State agencies have taken appropriate legal action under their own laws to assure compliance. Okay?

And I think that is a fair statement about what your reports showed. Are we set then? If we are in agreement on that —

MR. POSTON: Haven't the States taken appropriate

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action in every case where the date has gone by?

MR. STEIN: No. I said where the State was convinced that a bona fide effort was not being made, they have either had a hearing, issued an order, or taken it to Court, and those specific cases are spelled out, if you followed the reports and read it.

As I read the reports, they moved on this with discretion. They didn't -- just because the date passed by -- they didn't say, "Okay, the date passed by." They evaluated the situation. When they felt the force of circumstances was such, and there was being a bona fide effort, they recommended adjustment. Where they did not, they either went to a hearing, or went to court action, or issued an order. I will say this: I think the reports of these five States are excellent, when you look at the enforcement reports. I think we are emphasizing the negative here, because under the circumstances, I really do think we have got a big cleanup program going, and we are just in that hard, hard phase right now where we are coming to the end of the planning and the beginning of the throwing of dirt and the pouring of concrete, and things always look toughest at this stage because things have gone on for a long time and the people really haven't seen things happen. But this is a stage we get into in every enforcement case, and I think

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we are moving along rather well.

Are there any other comments or suggestions?

I really do think that the States ought to be commended: one, for their candor and full disclosure, and I think our people are, too, for the exchange of views, for laying out all their efforts for everyone to see without any secrets.

I think we have come a long way with this, and unless there is more to say, I would like to thank all you people for sticking with us until the end. I think we are on our way to a cleaner Lake Erie, and the Conference stands adjourned.

(Whereupon, at 6:06 p.m., the Conference was adjourned.)

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STATEMENT OF CONGRESSMAN CHARLES A. VANIK, OHIO
BEFORE THE LAKE ERIE WATER POLLUTION
CONTROL ENFORCEMENT CONFERENCE

June 27, 1969

Mr. Chairman:

In four years of conferences, we have amassed over half a million words on the pollution problems of Lake Erie. The major sources of pollution continue to flow into Lake Erie.

I notice from last June's "Progress Report," that in Pennsylvania, two sewage cases were discussed. One was the Hammermill Paper Company and the other was Larry's Truck Stop. The Hammermill Paper Company was ordered to begin treatment of its wastes more than twenty years ago on February 26, 1946, but has been granted ten extensions. As of June last year, "negotiations" were continuing but an "agreement" had not yet been reached.

Larry's Truck Stop, on the other hand, had facilities but was not operating them properly. It was reported that the Pennsylvania Department of Health was going to "get after them."

This has been our problem. We've been "getting after" the truck stops and other little polluters, while "negotiating" with a large papermill for over twenty years. It is projected that there will be fifty million

people living on the Great Lakes by the year 2020. If we continue to approach the pollution problem by "getting after," ten people in a lighthouse here, twenty people in a Coast Guard station there, while ignoring the city of Detroit's failure to treat millions of gallons of sewage, the pollution will continue to grow faster than our solutions for it.

There is a great need for developing a coordinated program for Lake Erie. Water quality standards are not standard, for one thing. I see the State of Ohio has invented a new category that outdoes even the euphimous "Aquatic life B." It is "Partial Body Contact," but is not safe for swimming or children. I hope that the State does not expect people to go wading in water in which the bacteria count is five times the level considered safe for public beaches!

At the original enforcement conference in 1965, I first directed the attention of the Nation to a major source of Lake Erie pollution -- the dumping of polluted dredged material into the lake by the United States Corps of Engineers. Since then, the Corps of Engineers has been diking part of their dredged materials -- as high as 71.9% in some harbors in fiscal year 1969.

In a report titled "Dredging and Water Quality Problems in the Great Lakes," however, the Corps of

Engineers disclosed the results of a two-year study of dredging operations, and now it has been decided that no funds will be allocated for continuation of this vital project in fiscal year 1970. I would like to discuss a few of the findings of the Corps.

Last year, the "Lake Erie Surveillance Data Summary" of the Federal Water Pollution Control Administration stated "In a polluted zone only a few kinds of organisms can survive in the soft, shifting bottom organic blanket. These include sludgeworms, ... bloodworms, ... leeches ..." The Corps of Engineers reported that "... small forms of animal life in sediments were either killed or forced to move at some disposal sites." In the same paragraph, however, the Corps reported that "no harmful effects on water quality were positively identifiable." In other words, the Corps could find nothing conclusive in the fact that when they dumped their goop in the lake, they drove even the sludgeworms away.

"The Department of Interior disagreed with the conclusions of the Corps of Engineers, stating "While the study as conducted did not conclusively demonstrate a massive deleterious effect on water quality from open water dredging, it did show that polluted sediments were toxic to small forms of animal life. We believe that this fact should be recognized in the conclusions of the report."

Furthermore, the Corps of Engineers reported that "if all dredgings were put into diked areas, the volume of sediments and dissolved solids reaching the lake would be reduced by less than eight percent, and of pollutants by the same general magnitude." The Corps concluded, however, that this is only a "small part" of the problem. If we are talking about ending the major sources of pollution, I maintain that 8% constitutes a major source of pollution.

The Corps played down such possible improvements as reducing turbidity, odor, and oil slicks, and possible ecological improvements. This is particularly disturbing, since pollution of the bottom sediment is the most dangerous kind -- it is irreversible. This conference has discussed many times how phosphates in the sediment build up from year to year and are reused -- speeding the eutrophication of the lake. Is the Corps prepared to pass on to future generations a 10,000 square mile peat bog?

In its "cost benefit analysis," the Corps weighed the cost of diking dredged pollutants against immediate savings in water purification. Stating that the Great Lakes are "still an excellent source of municipal raw water," the Corps concluded that "reduced costs to municipal and industrial water intake systems were shown to be negligible." But what about twenty years from now?

The Corps, in its calculations, has failed even to consider pollution effects five years from now.

The Department of Interior stated that:

"The costs of a program to prevent pollution from dredging disposal cannot be justified on a cost-benefit basis in this study without attempting to engage in cost-benefits numbers of questionable meaning. We should point out that the values to be protected by this program and other programs intended to reduce pollution in the Great Lakes are the total worth of these lakes. The real worth of these lakes to present and future generations is almost incalculable."

It should be clear that we can't risk the life of a vital water supply on the "unconclusions" of the Corps of Engineers.

In closing I would like to call the attention of the conference to a bill presently before the Congress which has major implications for the battle against pollution in the Great Lakes.

On April 16th of this year, during the debate on the Water Quality Amendments of 1969, I introduced an amendment, now called section 20, which was accepted to provide for Great Lakes Water Pollution Control Demonstrations. It allows the Secretary of the Interior, with the cooperation of other Federal agencies, to enter into agreements with other public bodies to carry out projects

1. to demonstrate new methods and techniques,

and

2. to develop preliminary plans for the elimination or control of pollution

in the watersheds of the Great Lakes. The non-Federal public bodies pay not less than 25% of such project costs. The authorization is \$20 million.

It is my understanding that the amendment will be accepted by the subcommittee on Air and Water Pollution of the Senate Public Works Committee, and I am now trying to obtain full appropriation from the Appropriations Committee.

In testimony before the House Appropriations Committee, I suggested a number of technical anti-pollution projects which the twenty million could be used for. I would like to enter in the record my suggestions in this area, but I would also urge you as scientists and as people engaged in this vital struggle against pollution to begin to develop your own ideas and your own suggestions on how this twenty million can best be spent to save the Great Lakes. This amendment is the chance for new and innovating ideas for a comprehensive attack on the pollution of the Great Lakes and Lake Erie. Only with your ideas and contributions can this program be made a success.

Ideas submitted to House Appropriations Committee

by Congressman Charles A. Vanik

1. Coordinated Federal-State-local research,
monitoring, and model basin studies assistance

The House Science and Astronautics Committee in a 1968 report noted that "monitoring in the environment is usually inadequate as to number of stations, length of time covered, and accuracy of measurement."

This is particularly true on the Great Lakes and it has become clear that we know very little about lakes and lake pollution in general. There is a great need for research, and better dissemination of such research results between States, cities, universities and the United States and Canadian governments. I notice in today's paper that the highly respected director of Canada's Center of Inland Waters said that \$1.4 billion would be needed to clean up the U. S. side of Lake Erie. Adequate research should enable us to find cheaper ways to control pollution and lower the cost of cleanup.

A call to the Great Lakes Regional Office of the FWPCA resulted in a list of eleven areas where they feel more research is needed on Lake Erie alone. The Army Corps of Engineers Great Lakes Research Center has an additional list of research plans.

In addition, five Great Lakes States have been working together to coordinate research and anti-pollution programs on the lakes. Among the research tools advocated are detailed large-scale models of each of the lakes which will finally give us definite answers as to the whys of algae blooms, the effect of waste loads, currents, water levels and other factors on the environment. Such models will enable truly rational planning for the development of this huge industrial area. For example, Lake Michigan has one nuclear power plant; by 1973 it will have six. A model can show the best location and construction requirements of such potential polluters.

To develop such information in Lake Erie, 50 to 70 surveillance stations along a grid network have been proposed for the intensely polluted western Lake Erie basin alone. Sampling could be done of the shores of the lakes to pinpoint sources of pollution and progress in curbing the flow of wastes and industrially created heat.

Finally, cities and communities could be assisted in establishing systems to monitor incoming water and to keep records on such water quality so that we may have a more complete record of lake problems and conditions.

2. Aeration of dead bodies of water

A system of floating or shore-based pumps to force oxygen up through presently dead bodies of water would

improve the quality of marine life, bring about chemical reactions to break up the worst pollutants, and encourage current flows and flushing action. Such a project would be ideal for the five-mile length of the Cuyahoga River as it flows through Cleveland where there is no oxygen or form of marine life. Such a process could also restore some 2600 square miles of oxygenless water in the center of Lake Erie and be of assistance in many of Lake Michigan's tributaries.

3. Crop planning, beach and erosion control

One of the largest sources of nutrients and chemical pollution is runoff from agriculture fields and land erosion. Bottomlands are needed for planting and, for the foreseeable future, chemicals are needed for healthy crops. But experimentation with fringes of land around rivers and lakes planted to prevent runoff and erosion can be developed and applied to cut down on the resultant nutrient enrichment of waters.

4. Dredging of highly polluted bottom materials and disposal of harbor dredgings into contained islands

Such islands would be particularly beneficial for airport, recreation, and, of course, pollution control, off Cleveland and in western Lake Erie.

5. Diversion of pollutants and collector canals

Lakes are basically stagnant bodies of water.

Where feasible nutrients and pollutants that can be diverted into flowing bodies of water or collected in canals between the shore and a lake breakwater and routed elsewhere should be developed to help the lakes. Deep well disposal and injection of pollutants into lower rock strata should be considered.

In addition, diversion of fresh waters into lakes and better control of water levels in the lakes can aid in the flushing process. Studies between States and between America and Canada on this issue should be begun.

6. Introduction of algae that have an inhibitory growth on more obnoxious forms of algae might be experimented with.

7. Dispersion of discharges into main channels, colder levels of water, or bottom materials better able to react and absorb them.

Present research indicates that better planning of discharge can significantly cut down the effect of nutrients in the lakes. This is particularly true in the Detroit area where the mass of discharges, treated and untreated, are released in a small, slow moving channel, rather than into the larger and colder central Detroit River.

8. Study by the States and the Federal Government on ways to increase the flow in the western basin of Lake

Erie.

The western basin of Lake Erie is perhaps the worst concentration of pollution in the Great Lakes, not only because it is an extremely shallow area, but because (as the map shows) for large parts of the year the dominant bottom flow pattern is circular -- thus the pollutants from the upper lakes and Detroit do not so much flow through Lake Erie and on to the ocean, they flow in circles in western, cesspool-like Lake Erie. Study could easily determine where dredgings in this shallow area could be dumped to form shoals that would break this circular cycle and force a direct flow through the lakes, much as a river flows.

GREAT LAKES BASIN COMMISSION

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June 30, 1969

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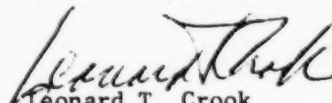
Mr. George Harlow
Federal Water Pollution Control Administration
U. S. Department of the Interior
21929 Lorain
Cleveland, Ohio

Dear George:

The progress evaluation meeting on Lake Erie at Cleveland on June 27, 1969 was very interesting and useful. It certainly indicates that progress is being made, but we still have a long way to go on Lake Erie.

I did not have an opportunity to present a statement at the June 27 meeting. Enclosed is a copy of a prepared statement, which I hope can be incorporated in the proceedings of the meeting.

Sincerely yours,


Leonard T. Crook
Planning Director

cc: Mr. H. W. Poston
Federal Water Pollution Control Administration
33 East Congress Parkway, Room 410
Chicago, Illinois 60605
(with enclosure)

STATEMENT BY MR. LEONARD T. CROOK, PLANNING DIRECTOR
GREAT LAKES BASIN COMMISSION, ANN ARBOR, MICHIGAN,
AT THE PROGRESS EVALUATION MEETING IN THE MATTER OF
POLLUTION OF LAKE ERIE AND ITS TRIBUTARIES (MICHIGAN-
INDIANA-OHIO-PENNSYLVANIA-NEW YORK

June 27, 1969
Cleveland, Ohio

I am Leonard T. Crook, Planning Director on the staff of the Great Lakes Basin Commission. I will be speaking from the standpoint of the Commission as a whole and not necessarily representing the views of any individual Commission member. As most of you know, each of the States in the entire Great Lakes Basin (including the States represented here), as well as every Federal Department having a role in the water and related land resources of the basin, are members of the Commission.

The Commission is vitally interested in the progress of efforts to improve the water quality aspects of Lake Erie. You might be interested in the progress of the Great Lakes Basin Commission's efforts in related water resource investigations. At the present time, it is sponsoring the ongoing Great Lakes Basin Framework Study which is to be concluded in 1972, with a draft of the main report scheduled for mid 1971. Lake Erie is an integral part of this Framework Study and all of you conferees are partners in it. This study, a preliminary-type investigation, will (1) provide broad-scaled analyses of water and related land resources needs and problems, and (2) furnish estimates of the probable nature, extent, costs and timing of measures for their solution.

The Great Lakes Basin Commission was established by Executive Order on April 20, 1967 and in accord with the Water Resources Planning Act of 1965. The principal duties and responsibilities of the Great Lakes Basin Commission, as stated in the Act, are:

The Commission shall, to the extent consistent with Section 3 of the Act--

- (1) serve as the principal agency for the coordination of Federal, State, interstate, local, and nongovernmental plans for the development of water and related land resources in its area, river basin, or group of river basins;
- (2) prepare and keep up-to-date, to the extent practicable, a comprehensive, coordinated, joint plan for Federal, State, interstate, local and nongovernmental development of water and related resources: Provided, that the plan shall include an evaluation of all reasonable alternative means of achieving optimum development of water and related land resources of the basin or basins; and it may be prepared in stages, including recommendations with respect to individual projects;
- (3) recommend long-range schedules of priorities for the collection and analysis of basic data and for investigation, planning, and construction of projects; and
- (4) foster and undertake such studies of water and related land resources problems in its area, river basin, or group of river

basins as are necessary in the preparation of the plan described in clause (2) above.

The river basin commission shall--engage in such activities and make such studies and investigations as are necessary and desirable in carrying out the policy set forth in Section 2 of the Act and in accomplishing the purposes set forth in Section 201(b) of the Act.

We are here today to evaluate the progress of action programs for pollution control on Lake Erie and its tributaries. You conferees have made many studies on water quality in Lake Erie and its tributaries, and developed plans for water pollution control. Governmental units at all levels from the local boards to the Federal government, including many private interests, have worked very diligently for many years at carrying out these plans. In a recent report on "Great Lakes Institutions" cosponsored by the Great Lakes Basin Commission, as many as sixty-two (62) State, Federal and international agencies are active in water-related activities in the Great Lakes area. In addition, many universities, local governments and nongovernmental entities are also active in various aspects of evaluating problems and finding solutions. As a result, we find there are many diverse and duplicated studies--either single-purpose, or so-called multi-purpose or comprehensive--related directly or indirectly to the water quality problems on Lake Erie and its tributaries. As far as we have been able to ascertain, no other agency has attempted to correlate all these studies and determine the total impact of these studies and the solutions they propose upon the water quality of all the lakes themselves.

These problems are very complex, the solution to one problem has to be related to the solution for other problems, and what one unit of government does, or what private entities might do, must be related to actions of other units of government or private entities. The need for overall coordination seems apparent. Congress recognized this when it enacted the Federal Water Pollution Control Act. But it saw need for more coordination and went further. It recognized that coordinated and comprehensive action to solve pollution problems must also be related to coordinated and comprehensive programs in every other aspect of the water and related land resources. Hence the Water Resources Planning Act was passed in 1965.

As I said, the Framework Study for the Great Lakes Basin is now underway. Later studies for development of the more detailed Comprehensive Coordinated Joint Plan will provide the means for developing the action programs in the matter of water quality as well as all other aspects related to the water resources of Lake Erie and its tributaries. The Work Groups organized for the development of the Framework Study have representation from all State and Federal and many local governmental units as well as some private firms. The Great Lakes Basin Commission is the principal coordinating agency. These Work Groups are now assembling data on the Great Lakes Basin and making preliminary evaluations. The Work Group on Water Quality has a Lake Erie sub-group which represents many segments of state and local governments, and private entities in the Lake Erie area. As results are developed, these will be coordinated with any plans being developed by any governmental units or private areas for the conservation and utilization of the water and related land resources of the Great Lakes Basin.

The Maumee River Basin has been evaluated by the Federal Water Pollution Control Administration as providing major contributions to the pollution problems in Lake Erie. In particular, the sediment input to Lake Erie from Maumee River has been recognized as being one of the more serious problems. Because of the many interrelated problems in water and related land resources in this basin, the Commission is sponsoring at the request of the involved States, a detailed planning study on the Maumee River Basin. This will be an action producing type program in that the study will recommend specific actions to be taken at all levels of government and by private interests to secure for the people of Maumee Basin, and with direct results upon Lake Erie, the full range of uses and benefits which may be provided by balanced conservation and development of the water and related land resources of this area. This study could serve as a basis for authorization of projects by Federal agencies for implementation of recommended measures within 10-15 years after the report is completed. It will provide guidance for administration of Federal and State assistance programs and will guide community and regional action programs as well. Depending upon Congressional appropriation of funds, the study is scheduled to start in Fiscal Year 1971, with the combined efforts of State and Federal agencies, local governments and private interests, under the coordination aspects of the Great Lakes Basin Commission.

With the multitude of data collection, data analyses, studies and reports now available on water and related land resources in the Great Lakes Basin, including the Lake Erie portion, it is difficult to relate with any one mind, or with any group of minds all this data without some assistance. You conferees recognized that use of automatic data processing, electronic computers and system analysis would be extremely valuable. At your last progress evaluation meeting held June 4, 1968, a systems approach for water quality management was discussed. You are to hear a report of efforts made by your participants to implement this program. In a parallel program for all the lakes the Commission recognized the complexities of the problem--not only of water quality in the lakes--but of all physical, chemical and biological aspects in the lakes, and also of the cultural effects upon water and related land resources in the Great Lakes Basin. If found practicable, it intends to sponsor a systems analysis for all of the Great Lakes starting in Fiscal Year 1971, again depending upon Congressional appropriation of funds. This main study will be conducted by all interested State and Federal agencies, universities and local government entities, with the development of the systems analysis models to be made by private and/or university contractor/s. The models would be of such detail and scope that action programs would be determined through assessment of alternative courses of direction for structural, nonstructural and management measures. During the next four months, the Commission and its member agencies will sponsor a Practicability Study so that the direction, scope and timing of the Main Study may be more firmly established. At Mr. Ralph Purdy's (Michigan) suggestion, a Board of Technical Advisors has been appointed to advise on the goals and objectives of the Practicability Study.

In conclusion, it is obvious that the water and related land resources studies by the many agencies, entities and private interests have to be coordinated to achieve the most desirable immediate and long range objectives of water quality and related programs. We are seeking to find

the best means for coordinating our efforts at improving water quality with our attack on all aspects of the total water problems. We need to put these means into balanced action programs by making the best choices between alternative uses of our water resources, including the enhancement of our water quality environment. Coordinated joint planning would permit us to make these choices with knowledge and wisdom. We are happy to cooperate with the conferees in any mutually satisfactory manner.